VISUAL INSTRUCTION IN THE PUBLIC SCHOOLS

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PREFACE

Within the last decade the demands of society upon the public schools have increased greatly. As a result, many more topics and increased amounts of subject matter must be taught. The purpose, of course, is the better equipment of the child for life's duties and responsibilities.

In order to accomplish this additional work with economy and efficiency the modern school has been obliged to develop a new approach to its task. It has therefore discarded the older methods of teaching, which proved themselves slow, cumbersome, wasteful, and very ineffective when applied to the larger load which the modern school must carry; and it is rapidly utilizing the most effective procedures known to science for the promotion of learning. The endeavor of every progressive teacher at the present time is to plan school work so that pupils may master it much as efficient people outside the schools master their tasks. This is accomplished by giving children a fundamental understanding of the motives that underlie the work they do, so that there is implanted within the children themselves a never-failing source of inspiration to carry on.

The teacher who has succeeded in this high endeavor finds in visual instruction one of the strongest methods of promoting natural learning and the proper motivation of the pupil's efforts; and in visual aids she finds the most efficient instruments wherewith to bring vividness and concreteness to the child in his attempts to learn. Through its use in modern education, many economies are made possible; for it naturally follows that results are

more definite and are secured in much less time. Indeed, if visual aids are sufficiently and properly used, the greater load put upon the school in recent years may be satisfactorily carried without prolonging the child's period of training and with much greater benefit to him in equipping him for life's duties.

It is the realization of the great service which visual instruction, rightly used, can render to the classroom teacher that has led to the preparation of this book. This realization has come to the author gradually through several years' experience as teacher, principal, and supervisor in the public schools, and as a trainer of teachers in the State Teachers College, San Francisco, and through the Extension Division of the University of California. The book brings together the results of this varied experience with visual instruction. Its aim is to guide the teacher so that she will be able to use visual materials of all sorts with proper economy and with the best possible results.

The text is organized in three parts, each of which is divided into chapters. Part I seeks to give a background that will enable the reader to use understandingly the various types of visual aids in ordinary teaching situations.

Part II is concerned with the modern methods of educational procedure and emphasizes, particularly, practical ways and means of using visual materials for the enrichment of the various subjects of the curriculum. These chapters are concretely illustrated by reports of actual classroom experiences.

Part III is devoted to the problems of training teachers in a larger use of visual instruction. The second chapter in this section offers suggestions for organizing and maintaining a visual-instruction department in any school system.

At the end of the book, in Appendix A and Appendix B, definite information is given to teachers who wish to

obtain the materials or apparatus needed for this work. A classified list of commercial dealers who handle the various types of visual aids and projection equipment may be found in Appendix A. Appendix B offers suggestions regarding suitable illustrative materials to be used in teaching certain subjects of the curriculum. In suggesting where these materials and apparatus may be obtained the author has made an earnest effort to avoid advertising any particular firm unduly. It must be remembered, however, that newer materials and more improved equipment are being developed rapidly in order to meet more adequately the needs of the classroom.

Thus far the information in the field of visual instruction has been scattered and indefinite, being confined mainly to magazine articles and pamphlets. There is need for a single volume which not only gives general information regarding this subject, but which also gives teachers and supervisors concrete guidance in their daily work.

The aim has been to include within these pages every practical suggestion that might be of help; therefore ideas have been gleaned from every possible source. Nothing contained within these pages is merely theoretical; all statements are based upon definite experiences in working with children of all ages. Care has been taken to check up every fundamental principle with the psychology vouched for by reputable experts in this field.

The author is deeply indebted to many authors and co-workers. A conscientious attempt has been made to give full acknowledgment to various sources quoted throughout the book.

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CHAPTER I

INTRODUCTION

As life increases in complexity and many-sidedness, improved ways of interpreting and mastering it must be found by the educative agencies of society. Life is rich and full only to the degree that we understand and appreciate the environment in which we live.

Much is said in recent times about efficiency in work and economy of time. These two factors are just as necessary and important in the educational field as in industrial and commercial life. Hence there is need of finding as many effective service agencies as possible to increase the efficiency of the teaching process. Among these agencies is to be listed whatever increases the appeal and clarifies the matter to be mastered, for such an agency aids economy and thus frees time for other efforts.

The present is in many ways an experimental period in education, a transitional period, a period of breaking away from the traditional formal ways of teaching in order to build up new and more effective discipline and training wherewith better to meet the needs of a broadening current life. Widening possibilities require a forward-looking educational program, and teachers and other educators are ever seeking new and better ways and means of improving and enriching the teaching procedure. It is a serious thing, however, to experiment hastily or unwisely with little children, nor do educators today need to do so. Modern education is scientific: its procedure is based on

psychological principles. The educational value of any new device or method is not determined by mere opinion or theory, but must meet the test of scientific investigation. The great educational movements of the last few years, the motivation of school work, the problem and project methods, educational measurements, and the like were based on accepted pedagogical and psychological principles. These have fairly stood the tests of science and have greatly increased the efficiency of teaching.

Modern educators are now considering the merits of another new classroom procedure. It is popularly known, for lack of a better term, as "visual instruction." This is one of the most widely discussed subjects in the field of education today, not only in America, where hundreds of schools are being equipped with up-to-date apparatus for the more efficient use of visual materials, but also in nearly every enlightened country of the world, including England, Sweden, Denmark, France, Germany, and Japan.

It is undoubtedly true that school authorities have been greatly influenced by the extensive use and educational power of the motion picture outside the school, in industrial and commercial fields as well as in the theatrical world. Its rapid growth and popularity have been little less than phenomenal in the past few years. Thousands of dollars are expended every year by hundreds of school systems for this new equipment and for its supervision and administration. There is not a progressive school system in America that is not already either making use of visual instruction or seriously contemplating doing so.[1] Eighteen school systems in the United States have well-organized visual-instruction departments with trained directors de-

[1] Visual Education Departments in Educational Institutions, *Bureau of Education Bulletin No. 8,* Department of the Interior.

voting all or a major part of their time to supervising the work in the schools, and thirty-four of the leading universities maintain distributing centers for visual materials. Eight of the largest museums in the United States, located in eight of our largest cities, furnish to public schools large quantities of valuable visual materials, such as exhibits, slides, and films. At least twenty-three universities and teachers' colleges in the United States are offering courses in visual instruction so that teachers may be trained in the technique of using visual materials.

The efficient use of visual instruction today involves many problems which have never confronted teachers before, and time and money are apt to be wasted through a lack of adequate knowledge of both materials and apparatus and the technique of their pedagogical use. There is a great need, therefore, for an intelligent study of these problems on the part of all educators, and the scientific educator who will apply himself to the establishment of visual instruction upon a sane and solid foundation has a unique opportunity.

Visual instruction, as a vital force in education, is in its infancy. We have scarcely had time for anything like a scientific evaluation of the use of such new devices as the motion-picture film in the teaching process. The film has come to the schoolroom from the world of entertainment and has brought with it many handicaps and limitations. One of the great dangers which confronts visual instruction in classroom teaching is the confusion of entertainment with careful learning. It is regrettable that too frequently attempts are made to use such appealing visual devices as a substitute for, rather than as a supplement to, the oral and written methods of gaining knowledge.

*

WHAT IS VISUAL INSTRUCTION?

The term "visual instruction" has been loosely and often narrowly interpreted. Many seem to have accepted it as meaning the use of picture projection on an illuminated screen. Furthermore, because of the novelty and great popularity of the motion picture, many seemingly extravagant claims have been made for visual instruction, which have not as yet been substantiated by careful experimentation. Individuals who make such sweeping statements as "Visual instruction will speed up civilization ten centuries in twenty years" or "Visual instruction will displace books in our schools" certainly have failed to keep in mind the fact that genuine learning results only from prolonged, purposeful self-activity, in response to the challenging situations of a social and natural environment.

Broadly speaking, visual instruction is not, of course, a separate subject nor even a new procedure in the teaching process. It is rather merely a means to an end. Visual instruction simply means the presentation of knowledge to be gained through the "seeing experience." The "seeing experience" has always been man's simplest and most natural means of gaining information. Objects, pictured illustrations, maps, and charts have played an important part in teaching for centuries, and have long been recognized by progressive teachers as not only valuable but indispensable.

The term "visual instruction" is used throughout this text in the broad sense accepted by leading educators; that is, as meaning the enrichment of education through the "seeing experience." It involves the use of all types of visual aids, such as the excursion, flat pictures, models, exhibits, charts, maps, graphs, stereographs, stereopticon slides, and motion pictures.

The new materials used in visual instruction, which have caused such widespread interest and such enthusiastic and possibly extravagant claims, are the natural outgrowth of marvelous developments in the art of photography. These developments have brought two new elements to our pictured illustrations, which seem to add greatly to the vividness and effectiveness of the visual experience. They are, first, the element of motion in the form of the motion picture, which so charms and captivates all, and, second, the element of depth, or third dimension, which is present when the stereograph is observed through the stereoscope. This clever device inveigles one into accepting the pictured experience as a reality, and thus has a distinct advantage over other agencies in bringing correct mental images and truth to the learner.

PROBLEMS TO BE SOLVED

New materials mean new problems. Some of the paramount questions, then, which are demanding solution in the field of visual instruction are these:

What is the intrinsic value and the place of these newer devices in the teaching process?

If the two new elements—element of motion and element of depth, or third dimension—greatly enhance the value of visual experience, to what extent is efficiency in learning increased through their use?

Will the use of visual materials tend to retard and break down ability to think, or will it tend to stimulate deeper thinking and more logical reasoning on the part of pupils?

Must learning be made very difficult in order to make more lasting impressions? Will the use of visual instruction tend to deepen the impression or tend to make education too easy and superficial?

These are serious questions and must be answered cautiously and scientifically. The results secured with any educational tool depend chiefly upon its judicious application in a given situation. How it is handled is an important factor. It has therefore become quite evident to experienced teachers that these newer, more complex and probably superior educational tools need to be experimented with scientifically if they are to be better understood. On account of their newness and complexity a special technique must be developed for their use, in order to gain the maximum efficiency with the least expenditure of time and energy.

Nor can educators longer justify themselves in standing aloof and hesitating and criticizing in respect to these new materials in education. The stereograph, the stereopticon slide, and the motion picture have already found a prominent place in many educational systems, as was noted on page 6, and their influence is growing daily with unprecedented rapidity. These materials have come to stay, and every thinking educator is interested in their tremendous latent possibilities in the classroom. The serious and difficult problems are how to improve the quality of the materials and how to use them most effectively in teaching. Each type of visual aid has its own particular advantages and limitations in various teaching situations. The pedagogical problem is to determine in what stage of the learning process each will render the greatest service.

IMPORTANCE OF THE CHILD RATHER THAN THE TOOL

It should be emphasized here that this book is not concerned with any one particular educational tool or device, as such. An educational tool is of interest to the teacher

only to the degree that it may help pupils solve their childish problems and stimulate their interest in gaining new knowledge, thus aiding them to learn happily and live abundantly.

The truth must not be lost sight of, that the object of all professional efforts is the child, his needs and interests. Enthusiasts are apt to become so absorbed and interested in theories and attractive devices that they seem to lose sight of what it is all about, — namely, the child.

THE SCHOOL AS A MODERN SOCIAL INSTITUTION

If the school is to make any attempt to keep pace with life and to meet the definite needs of society, it must take advantage of every valuable contribution of modern science and invention as it is perfected, so that it may fulfill its function with increased economy and efficiency and enhance the joy of living. The motion picture, the radio, and the typewriter have not only brought untold wealth and greater efficiency to the business world; they have greatly enriched life generally in every corner of the globe. When such modern devices are common and necessary in the home and business world and have actually become a part of life itself, the school as a social institution cannot properly content itself with obsolete methods and antiquated equipment and expect to attain any satisfactory degree of efficiency in training boys and girls to meet the problems of current life. School and life must be one and the same, and modern school procedure must be up-to-date and progressive. Not to endeavor to keep pace with life is little less than educational suicide.

CHAPTER II

FUNDAMENTAL REASONS UNDERLYING THE USE OF VISUAL AIDS

"Yes, the golden plover flies all the way from Brazil and the Pampas Plains of Argentine to the northern coast of Canada to nest and rear its young. About August these birds migrate back to Brazil before the cold weather sets in, traveling a total distance of about ninety-four hundred miles each year. The dotted lines of this chart show you the regular round-trip route from Argentine, up the Mississippi River Valley to the Arctic regions and back by way of Labrador, Nova Scotia, the West Indies, and Brazil," a tall, sturdy boy was saying to a class of eager, interested children. His audience sat fascinated and spellbound as they listened to the lad explaining, vividly and concretely, with the aid of a large pictorial chart and bird specimens, the strange, interesting story of bird migration. And thus all sat for fully twenty minutes, eager, hungry to hear more, and asking significant questions. The experience was made so vivid and real that the pupils actually lived with Tom and his birds.

Just three months before, Tom, a motherless lad, had come to this little social group after spending several unhappy months in a boys' detention home. He was full of life and craved physical activity, and he was, though no one had discovered it, a keen lover of nature and the great out-of-doors. The formal discipline of the schoolroom, the humdrum recitation of uninteresting, abstract facts out of

dry textbooks depressed and discouraged him; so, failing to find or to be guided to opportunities for normal, natural self-expression, he fell into unwholesome activities, became an habitual truant, and developed a morose, sullen disposition. For months he was a burden to the state and society, not because he was naturally bad, but because he had fallen into a depressing environment that lacked appeal. He could not compete with members of a large group formally controlled. He therefore found himself out of tune and could not adjust himself to the situation. But as soon as he was transferred to a social group where the specific needs and interests of all boys and girls were more closely studied and were made the starting point for educational activities, and where boys had opportunities to release their physical and emotional energy by doing things, by handling and seeing things, Tom found himself, gained a new grip on life, gradually developed self-confidence, and could assume responsibilities as well, if not better, than any other boy in the class. In fact, he was invited to take his charts and

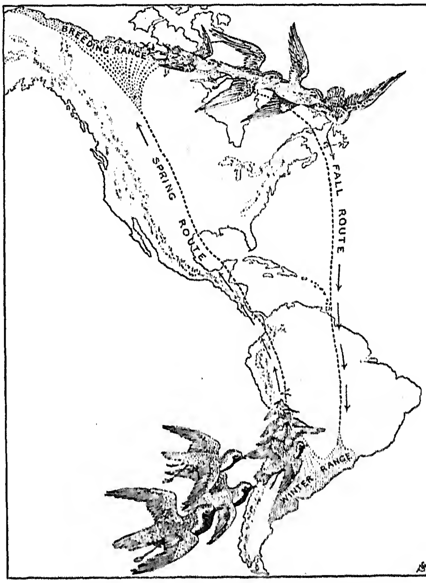


FIG. 1. Diagram showing the course followed by the golden plover in its annual migration

This migration is exceeded in extent only by that of the arctic tern, which flies from the arctic region to the antarctic

specimens and talk to several neighboring schools. This he did with the ease and poise of an experienced adult, simply because interest and understanding were there.

Tom had found a real friend and mother in his teacher and seemed to treasure her above all else. What a blessing these genuine, sympathetic mother-teachers are! Books to Tom had formerly meant only dry uninteresting printed pages, dealing with abstract, meaningless facts that had to be memorized and recited back to the teacher; but, what a revelation when he realized that from these same books he could gain the information he needed to answer his questions and solve the problems that confronted him daily. So Tom learned to read better and to treasure books for their true worth.

Tom is only one of thousands of boys and girls in our schools today that find school life uninteresting and irksome, nay, even depressing at times. Is there any logical or legitimate reason why school life cannot be made a happy, invigorating, growing experience for all types of children? When situations like Tom's are met, one is inclined to ask: "Is the public school, generally speaking, meeting the needs of society today?"

FUNCTION OF THE PUBLIC SCHOOL

First, let us consider for a moment just what the function of education and the public school is according to modern thought. In discussing this problem Herbert Spencer says:

How to live? — that is the essential question for us. Not how to live in the mere material sense only, but in the widest sense. The general problem which comprehends every special problem is — the right ruling of conduct in all directions under all circumstances. In what way to treat the body; in what way to treat the mind; in what way to manage our affairs; in what way to bring

up a family; in what way to behave as a citizen; in what way to utilize all those sources of happiness which nature supplies — how to use all our faculties to the greatest advantage to ourselves and others — how to live completely? And this being the great thing needful for us to learn, is, by consequence, the great thing which education has to teach. To prepare us for complete living is the function which education has to discharge; and the only rational mode of judging of any educational course is, to judge in what degree it discharges such function.[1]

If this philosophy is accepted as the goal of modern education (and it constitutes the basis of present-day educational procedure), it is evident that the public school must organize its curriculum and methods of procedure to meet definitely the supreme need of child life, — namely, the opportunity to develop happily and normally.

Subject matter should be taught in the school because of its intrinsic value and not for the purpose of discipline; facts, as such, are of little value if they are not applicable to life as a continuous growth. Public-school education should therefore be not only practical, but it should be appealing to childhood; and, in order that it may be appealing, children must be allowed to participate in interesting experiences which are natural to life outside the school. In such experiences children may be guided to the acquisition of a necessary amount of knowledge of life and the world in which they live, while at the same time they develop desired habits, attitudes, and skills; thus they are learning to live, and school becomes "continuous with life — not apart from it."

On the whole, the school as an institution has performed its work well, and its present apparent inefficiency is probably in large measure the unavoidable accompaniment of the age in which we live. For the last thirty years civilization

[1] Herbert Spencer, *What Knowledge is of Most Worth.*

has rushed onward at such an unprecedented rate that the school as an institution has not been able to make all the necessary transitions rapidly enough to meet adequately the needs of the age that now confronts us. Science and invention have brought a baffling multiplicity of new tools and opportunities and with them new problems and situations. In consequence the responsibility laid upon the public schools has been tremendously increased. This is due to many things.

In the first place, with the advance in civilization the relation of education to successful living and government became more apparent, and governments have therefore enacted compulsory-education laws. These laws vary somewhat in their requirements, but they all have the practical effect of compelling all the children of all the people to attend school. The varying interests and abilities represented by such a school population place a heavy responsibility upon public education; for each child must be profitably served. In the second place, the school is held responsible for maintaining all lines of social progress, and to that end must prepare its pupils for all the varied activities essential thereto. Each pupil must find that help in the public school which will enable him to become equipped for the thing he should do in order that he may make his maximal contribution to the welfare of all.

The school is therefore under the necessity of providing rich and practical curricular advantages for its pupils. It must likewise develop those procedures in promoting learning that will train each child fundamentally and thoroughly with the least possible waste of time and energy.

These added responsibilities are great indeed, but the situation is not so discouraging as it may seem. While these difficulties were accumulating, not only was modern psychology revealing better ways and means of working

with children, but mechanical science was developing certain educational tools that seem destined to bring a very great contribution to education and to offer one of the most hopeful remedies for eliminating waste and increasing the efficiency of school work. The remedy is visual instruction, and its important tools are known as *visual aids*. It is requiring some time, however, for the full meaning and significance of visual instruction as an important factor in the teaching process to become established generally. Just as many other improvements in the public schools came as a result of pressure from outside the educational field, so the more adequate use of visual instruction in teaching is coming as a result of seeing its effective use in the commercial and industrial world.

HOW VISUAL INSTRUCTION MAKES TEACHING EFFECTIVE

Since visual instruction functions as an aid in making teaching procedures effective, its general values in the educative process should be briefly set forth before taking up the detailed consideration of the separate visual aids and their application in teaching the various subjects. A satisfactory educative procedure must insure keen interest on the part of pupils, move forward with due economy, and demonstrate its efficiency in promoting teaching and learning. How does the right use of visual instruction in teaching help to insure interest, economy, and efficiency in teaching and learning?

Interest in learning. As a result of study, research, and successful practice, educators have come to realize the importance of interest and motive in relation to learning, and the whole plan of modern education is based on the so-called "doctrine of interest."

John Dewey says that interest is intrinsic; that where interest exists the pupil does his work not because he hopes to escape some punishment or get a high mark, but because the work of itself commands his attention.[1]

When one is interested he responds appreciatively to an object or a situation. However, his reaction may carry him no further unless there is a real motive back of it which stimulates him to go far beyond what mere interest can do. Actual achievement or realization of an end comes only through sustained interest which calls forth energetic thinking, and furnishes that inner urge, that longing to know and achieve. Curiosity and interest are bound up together, but when interest ceases, growth ceases, regardless of the original motive.

When a child works under compulsion, he usually gives just as little attention to the work as may be necessary to escape painful or embarrassing results. So long as the attention is forced, part of the energy is used in keeping himself at the task. Thus effort is taxing, and worth-while work becomes impossible. It is not uncommon for children to divide their attention most skillfully between distasteful school tasks and out-of-school activities in which they are vitally interested. This failure to give undivided attention to the work in hand results in an inability to concentrate, which cannot fail to be disastrous for the highest intellectual attainment. Moreover, children who have been thus driven come to look upon books and lessons as something of a nightmare, and are only too glad, when the opportunity presents itself, to leave school and go to work. The child's attitude, growing out of his school experience, is quite as important as any knowledge he may acquire.

Interest, then, assures the greatest amount of voluntary work on the part of the individual. If a boy becomes so

[1] From *Interest and Effort in Education*, chap. i. Houghton Mifflin Company.

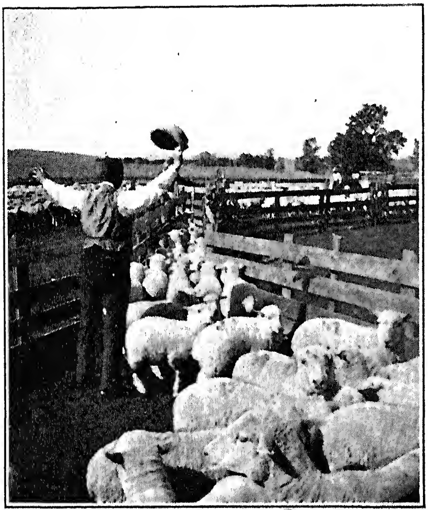
interested in the radio that he feels the urgent need of making one, he is likely to study every book he can find dealing with the construction of radios. He goes to stores and examines all types of instruments. He consults everyone who can give him any definite enlightenment regarding their construction and operation. He works hours and days in perfect happiness and with no sense of fatigue. Why? Simply because interest and motive spur him on to do his best to satisfy that felt need. Someone has said:

> Interest and information are reciprocal; interest leads to the acquiring of information, and added information brings added interest. Add to these the stimulative power of emotion, as found in the wholesome admiration of an ideal, and there are present the fundamental factors for setting up a point of view or developing an attitude.

Children, largely because of their limited experience and lack of knowledge as a basis for understanding and appreciating, are not interested in the abstract or the far away. They are more apt to be interested in things, objects, and people. They seem to be attracted to the new and the novel. But this charming characteristic of childhood, this interest in everything about them, must be utilized as a basis for an improved educational procedure. Children are creatures of unlimited curiosity; this curiosity leads to interest, and interest stimulates the imagination and often calls forth thinking which results in significant activity.

It is utterly impossible for any individual, whether adult or child, to unfold and grow mentally, physically, or spiritually in an environment that is not conducive to happy living. A depressing environment deadens the spirit and stunts intellectual growth. Happiness and growth are interdependent and come only as the direct result of continuous participation in interesting, satisfying activities. This is just as true in school as in life outside the school.

Every schoolroom, therefore, must provide abundant concrete, legitimate appeals that will lead children into new educative experiences. Of the sensory appeals, especially with young children, the visual appeal is probably the most effective. Pictures and objects afford a never-failing stimulus to both old and young. If a new picture is hung on the wall, immediately we hear, "Who are they? What are they doing? Why is it they dress that way?" If a new flower is brought into the botany class, instinctively the question is, "What is it? Where did you find it?" In order to answer the questions, to solve the new problems presented, and to gratify this longing to know, books must be read and other pictures consulted before complete satisfaction is gained.



© Keystone View Co.

FIG. 2. The shepherd and his flock

This picture aroused new interest and conveyed correct mental images

Early last winter a bright little kindergarten boy brought in a handful of raw wool which his uncle had sent from a northern sheep ranch. He eagerly displayed his exhibit to his classmates, and extreme curiosity was immediately aroused. "What is it? What is it for? Where did you get it? Let me feel it," and many other questions and statements followed in rapid succession. This led to a discussion of the kinds of clothing they had on. The members of

the group were delighted to find that their variously colored coats had once been the coats of sheep, and they were curious to know how they had been made.

The kindergarten director, quick to take advantage of the situation, introduced two or three excellent stereographs from a classified set, which showed the sheep ranch where the sheep were cared for by the shepherd (Fig. 2), a lamb feeding, and the shearing of the sheep (Fig. 3). The class formed in a circle; the pictures were placed in a stereoscope one at a time, while interesting questions and effective discussions were heard on all sides. After these pictures had been slowly and carefully viewed by the entire group the stereographs were placed on the reading table for later independent observation. The teacher then asked a few questions to see how much these little children had got out of the picture lesson. Not only did they display a simple understanding of sheep life and a little knowledge of the wool industry, but most of them could pick out the woolen clothing from clothing of other material. Nor was this all. Other interesting results followed from this group discussion. Many new words, such as "shepherd," "shearing," "ranch," and "lamb,"—words that represented new

FIG. 3. Shearing sheep
Where our woolen coats come from

correct mental images,— were used with fine poise. Many educative projects sprang from this picture experience and carried over for several days. One such project was the making of a crude sheep ranch in which were sheep, shepherd, and dog, all made with modeline. The children were so keenly interested in the wonderful shepherd dog that they brought many pictures from home and told many stories concerning dogs they had seen or owned.

Here was an instance in which the seeing and handling of a small handful of raw wool stimulated sufficient curiosity and interest to form the basis for days of significant self-educative activities. The outcome was the acquiring not only of useful information but of new attitudes and skills through the doing and seeing experiences that were participated in by these mere babies.

Interest is indeed a vital factor in the teaching process, and visual instruction can play a very important part in helping to stimulate wholesome interest in subject matter, especially in the elementary grades, where the child's experiences are limited. John Dewey says: [1]

> The law and parents may guarantee the physical attendance of the child at school, but it is left to the teacher to insure his *mental attendance* by a sound appeal to his active interests. A child's character, knowledge, and skill are not reconstructed by sitting in a room where events happen. Events must *happen to him*, in a way to bring a full and interested response. It is altogether possible for a child to be present physically, yet absent mentally. Our whole policy of compulsory education rises or falls with our ability to make school life an interesting and absorbing experience to the child.

So interest is the key which opens the door and leads children to self-activity, to books, and to knowledge. But we must bear in mind that interest, in itself, is not a goal, but only a most valuable means to an end, and therefore is

[1] From *Interest and Effort in Education*. Houghton Mifflin Company.

legitimate only when it fosters growth and development. Just here the overenthusiastic teacher must be cautioned and guided in the proper use of visual aids, lest she resort to the erroneous practice of making things interesting merely for interest's sake.

Economy in education. Conservation of time has been emphasized in preceding pages as being as necessary in

FIG. 4. The Great Falls of the Yellowstone from Lookout Point, Yellowstone National Park

educational procedure as in the management of any industry or business. The child's time is precious, and the methods employed must be not only appealing and effective, but must be executed with the least possible waste of time and energy. An old Chinese proverb says, "One picture is worth ten thousand words." Though not to be taken literally, yet, as in all proverbs, there is a recognized truth in this saying that has come down to us through the ages. We do know that a few moments of intense study of a good picture will bring correct information that it might

take ten times longer to gain from a long, printed account. Why waste the valuable time of children requiring them to read printed descriptions of the Yellowstone National Park or the Yosemite Valley when we know that in thirty minutes' time, through the medium of a few colored slides (Fig. 4) or, better still, through the colored motion picture, they can learn more than any word picture can ever teach them? How often also do we waste precious time sending children to dictionaries or reference books to get word pictures of objects, places, or things, when we well know one definition may contain so many unknown words that the child would be compelled to refer to two or three definitions in order to analyze one. As a reward for this expenditure of time and energy he receives no real truth or enlightenment. If that same child had access to a well-catalogued set of stereographs designated by numbers in specified drawers, he would in just a few moments gain true mental concepts of a Muir glacier, the Colosseum at Rome (Fig. 5), or a llama carrying his burden up the steep Andean highlands.

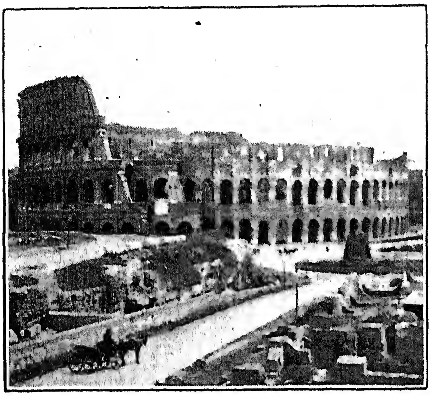


FIG. 5. Pictures serve as illustrated dictionaries

In science, in the study of the development of life, such films as "The Monarch Butterfly," "Toads," or "How Life Begins" give more understanding and appreciation in an hour, after the background has been established, than is possible in any other way. Nature is either

too quick or too slow in its processes to be perceived by the unaided eye; but in a few moments a whole group of students may have the opportunity to see and study processes of development that required days and weeks for their natural growth and unfoldment.

An instructor in a high-school science department has stated that for the last five semesters he has been using a set of motion-picture films entitled "The Story of Magnetism." Each semester after such visualized teaching he has given rigid tests, and each time he finds that the boys not only know a great deal more about the subject of magnetism than the classes of former years, but that they have saved over half the time formerly devoted to this subject. This teacher also testifies that the results are equally satisfactory in all subjects where he is able to use good educational films.

A sixth-grade teacher reported a like economical result in the study of the geography of Asia. By using many exhibits, taking a trip to the museum, using stereographs, slides, and a film as opportunity offered in natural classroom situations, the group mastered their problem in three weeks' less time than any former class had required. Furthermore, on account of the added interest and concreteness, made possible through the use of visual materials, the children had read more books of travel and fiction and were able to correlate their work more closely with other subjects than had before seemed possible.

Another visual aid that is making a fundamental contribution to modern education is the graphic chart. The adoption of this method of instruction by the business world has led the educator to find in this pictorial device a valuable pedagogical tool. With it, complicated data in history, geography, and science can be reduced to simple terms, interpreted, and understood in a few minutes' time.

Where there is a saving of time there is also a financial saving, and thus money is freed for other purposes.

There are many children who need concrete materials along with their textbooks. Through the visual experiences they come to desire the information that is in books, and so are impelled to learn to read intelligently. A visitor to a fifth-grade class in a semi-factory district noticed at the rear of the room a wire cage containing four or five different kinds of snakes and lizards. As he walked toward the cage of squirming reptiles, a lad close by began to beam pleasantly. Immediately the teacher seized the opportunity to ask the boy if he would not like to repeat the talk he had given to the group earlier in the day. Within the next fifteen minutes the visitor heard more about reptiles than he had ever known before. Each snake was taken out of the cage in a most loving manner, and as the boy stroked its head, he enlightened his hearers as to its life, habits, and use to man. The visitor was surprised, not only at the wealth of knowledge possessed by this young lad, but at the ease with which he used technical terms. Moreover, every child in the room had acquired an interest in and even a sympathetic appreciation for these wriggling creatures, and seemed genuinely to admire the beautiful coloring of their variegated and striped skins. Just imagine girls being interested in snakes!

Later the teacher revealed the interesting life story of this boy. Up to a year before he had been a serious problem. He took no interest in school work, and was greatly retarded, seemingly because he could not or would not learn to read. Finally he landed in a fifth grade where the teacher was rather unusual in discovering and developing the native interests of backward boys and girls. Through the field trips in nature study, Kenneth became absorbingly interested in reptiles, and began to make a small collection.

This led to a longing to know more about his pets, their real names, habits, how to care for them, and so on. After visiting the zoölogical department at the university, he learned of interesting books that contained all the information he desired; so he learned to read, and read understandingly. Today there is not a better reader in the class, and the number of scientific books that that boy has read is astonishing. This boy will never again be recorded as a "repeater."

Without a doubt the proper application of visual instruction will tend to reduce retardation in the public schools. Here again, both time and money may be saved with a substantial benefit to all concerned.

Efficiency in education. Interest and economy are important factors in the teaching process, and valuable visual materials used effectively and pedagogically tend to intensify interest and to save time and energy. They are indispensable factors. Yet it is equally true that they are valuable only as means wherewith to attain certain ends. For education seeks results, and these results control human behavior and regulate human conduct — human thinking, feeling, and acting. Dr. William C. Bagley says, in his book *The Educative Process*, "Education may be tentatively defined as the process by means of which the individual acquires experiences that will function in rendering more efficient his future action."

The teacher's problem, therefore, is how may she bring a greater degree of efficiency into her teaching without waste of time and energy? Now it is well known that from 50 per cent to 75 per cent of our teaching passes over the heads of the majority of our pupils, simply because it is too abstract and bookish.[1] It lacks interest and concreteness, and therefore meaning. What a waste of time and energy!

[1] This fact is revealed constantly as a result of examination.

Yet a large percentage of teachers are still absorbed in teaching their beloved subjects in the same old "hum-drum" manner in which they themselves were taught. They delude themselves into thinking that, because they are interested and thoroughly understand what they are talking about, their immature pupils with limited experiences likewise understand. Effective learning does not come in that way. Yet teachers are so prone to forget the great gap between youth and maturity that they fail constantly to apply the psychological laws that govern learning. Knowledge is gained through rich and varied experiences, and these experiences are very largely sensory experiences. From the cradle to the end of life's span we are constantly acquiring a wealth of information through touching, tasting, smelling, hearing, and seeing. Sensory experiences, moreover, are not, as a rule, separate, independent matters; on the contrary, they function in a reciprocal coöperation. We see a beautiful piece of fabric, and we immediately desire to feel it; or we hear a sound, and instinctively our eyes turn to seek its source. The song of the meadow lark appeals first, perhaps, to the auditory sense, but take it out of the natural environment that appeals to the visual sense, and the same song would not seem half so sweet. As Emerson has beautifully said:

I thought the sparrow's note from heaven
Singing at dawn on the alder bough;
I brought him home; in his nest, at even,
He sings the song but it cheers not now,
For I did not bring the river and sky;
He sang to my ear, they sang to my eye.

In this coöperation of the senses both man and beast have ever depended on the "seeing experience" as the main source of help in the struggle for existence. Tennyson wrote long ago, "Things seen are mightier than things heard."

A greater number of people see alike than hear alike. In fact, learning, especially with young children, is generally mentally recorded as images or pictures. We think in terms of the visual, and so it is quite natural that objects and pictures have a universal appeal.

Mention the word "automobile" to a group of automobile owners, and a clear definite picture of the individual's own car, or one he is much interested in, will instantly be

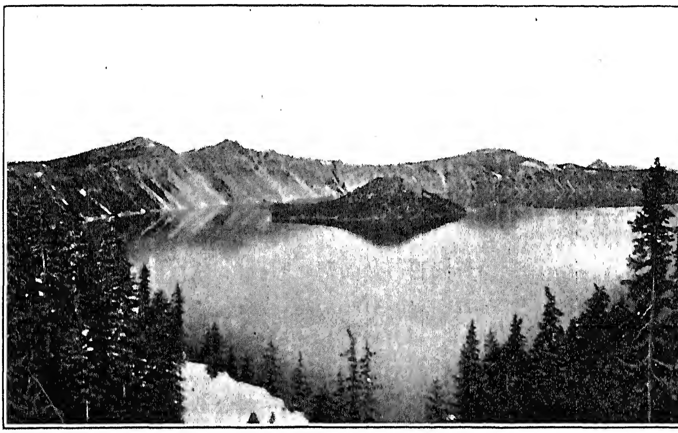


FIG. 6. Crater Lake, Oregon

Mere words cannot convey a correct image of such a wonder of nature as this

formed in the "mind's eye." Read aloud a beautiful word picture describing the wonders and charms of Crater Lake, Oregon, to that same group. Every mind will struggle to formulate a mental picture of the real lake; but we know that not a single mental image could possibly be correct or even nearly so, unless the individual has actually seen Crater Lake (Fig. 6) or a very realistic picture of it. The auditory sense experience must be complemented by the experience of vision if a correct mental image is to be formulated.

Furthermore, correct visualization is possible only through comparison of past experiences. The power to appreciate and enjoy depends on the richness of an individual's experiences in life. A child's world is small; he knows little outside his own home environment. His experiences, therefore, are limited; and so he is sent to school to be led into a bigger, richer life. But in the school the child is called upon to read about far-distant lands and mingle with strange, unknown beings, the like of which he has never seen. It is all outside the realm of his childish experience. He has, as yet, but little concrete association with many of the ideas about which he is reading; therefore the words are merely empty symbols. Until he understands concretely the ideas back of these symbols, he can gain no knowledge from them. If the first-grade teacher writes the word "c-a-t" on the blackboard, it is quite likely that no child will actually think of the animal, the cat, as such, but rather, through the law of association, each child will mentally picture his own beloved kitty, probably where he saw it last as it ran across his path on the way to school that morning. If the teacher writes the word "elephant" on the blackboard, the minds of the children are apt to be quite blank and unresponsive, unless some have actually been to a circus or have had vivid visual contact of some kind with elephants (Fig. 7).

Not long ago a teacher in a rural school questioned a little group of children as to their opinion regarding the size of an elephant. One little girl held out her chubby arms about two feet apart and said, "So big." An older boy, quite disgusted with such an answer, stated with great assurance that an elephant was fully as big as a cow or a horse. These responses were perfectly natural. None of these children had ever seen a circus, and their only experience with elephants had been gained from a poor little,

blurred picture in the textbook showing an elephant alone with no other object in the picture with which to compare its size — surely a very poor picture for any textbook.

We cannot expect the impossible. How can any boy who has always lived in the backwoods or mountainous country have a clear mental image of trains, boats, or the vast expanse of the ocean and its use to man. How can the lad of the broad prairies have any real concept of the lofty, majestic mountains far to the west. He is likely to measure everything by comparison with what is already familiar to him; a mountain he may think of as only an overgrown hill.

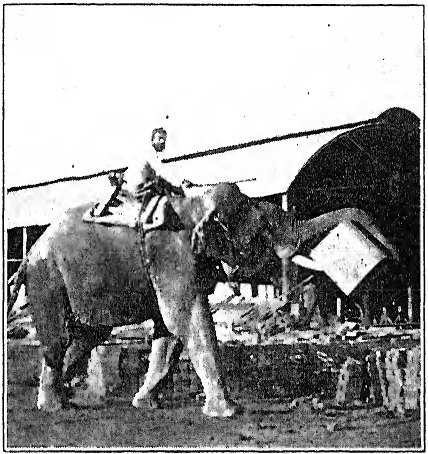


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FIG. 7. An elephant of India

After seeing this picture a child has a background for judging and comparing size and form

To enrich life we must enrich the environment. Every adult can recall periods of awakening in his own life, when through personal experience in travel or through the modern picture devices, mysteries and great truths have been revealed, correcting most ridiculous or erroneous conceptions of places and things which had been gathered from oral or written language. A grown man was quite astounded when, some years ago, his delusion of the great Sahara Desert was corrected through the medium of the motion-picture screen. School-day training had left the impression that the Sahara Desert was a vast level area

of drifting sand, stretching from the Atlantic over three thousand miles eastward toward the Nile. It was hard, indeed, actually to believe the truth, when realistic pictures revealed great rolling, almost mountainous stretches containing beautiful fertile oases, inhabited by thousands of people, happily living, tending their flocks and herds or cultivating their crops of vegetables, dates, and grain (Fig. 8).

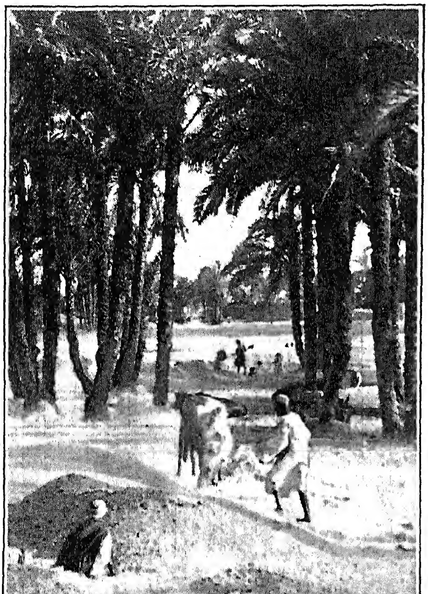

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FIG. 8. Egyptian peasants winnowing grain

An oasis in a desert

In a certain demonstration school, a wide-awake student was endeavoring to interest his classmates in the beautiful Taj Mahal at Agra, India (Fig. 9). The story of how this wonderful building happened to be erected by the Mogul emperor Shah Jahan, as a tomb for his beloved wife, held the children spellbound with interest. But when the story drifted into the description of the wonders of the building itself, with its delicately carved white marble exterior, its majestic dome flanked on each side by slender stately minarets surrounded by an exquisite Persian garden, the brows of the listeners began to wrinkle, and puzzling questions were asked in a vain effort to visualize what

it was all about. "What is a minaret?" asked one. The capable pupil used his best language to try to explain what he had seen in his reference book. The teacher endeavored to draw a minaret on the blackboard, a crude affair, but still puzzled expressions covered the faces of those eager to know, and the recitation passed on leaving only hazy impressions and half-truths that soon would be forgotten because no definite, permanent concept was fixed in the minds of the pupils. Time had been wasted, and a valuable opportunity lost simply for lack of foresight on the part of the teacher. Just one good stereograph or one colored slide introduced at the psychological moment would have made a deep, lasting impression on the minds of these children, whose interest had already been aroused by the fascinating story of the great devotion of a famous Indian prince. No finer opportunity could have presented itself for gaining a valuable appreciation of one of the world's famous works of architecture.

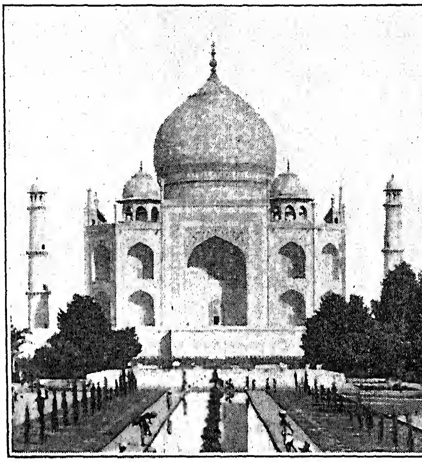

FIG. 9. The Taj Mahal, India

This is accounted the most beautiful building in the world. What is a minaret? Only the picture can explain concretely

Again, in moral and spiritual growth the most effective lessons are those that naturally occur in an interesting teaching situation; they present rare and unusual opportunities and should be treasured by every teacher. Errone-

ous impressions or impressions which are not clear tend to exercise wrong educative effects. Each element or influence introduced into the teaching situation should possess the greatest amount of reality and concreteness, in order to insure understanding through a correct visualization. The following extract from an address given by Dr. H. B. Wilson concretely illustrates this point.

Many well-intentioned efforts to store the minds of children with the world's wisdom have been found to fall far short of their lofty purposes when the actual effects children were experiencing were analyzed. An investigation of the meaning which the children were attaching to certain great songs which they were being taught illustrates well how inaccurate and incorrect the effects may be of a well-meant educative situation, because the teacher had not exercised sufficient care to insure that the appeal made to the children was real and concrete. This investigation showed that whereas the Sunday-school teacher was attempting to have her children sing, "Jesus was a rock in a weary land," they actually were singing, "Jesus threw a rock and away he ran." Likewise she was endeavoring to have them sing, "Thy consecrated cross I'd bear." It was found, however, that the children were singing, "The consecrated cross-eyed bear."

The human mind attaches to words meaning in keeping with its previous experience. The actual language of these songs expresses no experience which the children who were singing them had had. They therefore proceeded to read into the song such meaning as it might possess for them and adapt the language accordingly. So far as the teacher's efforts were concerned, however, the environment to which she was subjecting them was an inaccurate and unreliable one. It would be easy to illustrate how much teaching of nature study, geography, history, and literature falls as far short of the teacher's intentions as the songs above cited fall. Under such circumstances, the impressions made are inaccurate and unreliable and cannot be productive of the socializing effects which were sought. Visual education has a large contribution to make from the standpoint of bringing right stimuli, accurate impressions, rich environment.

Young children cannot think in the abstract; that ability is gained after years of experience. It is only after such power, acquired through the child's own actual experience, is possessed that he can think clearly enough to enable him to transmit his experiences to his companion, and can profit by reading or hearing of the experiences of others. In other words, the degree of a child's comprehension, which measures the effectiveness of our teaching, is determined by whether or not the child reacts in fundamental understanding ways to the stimuli and impressions to which he is subjected.

If teachers understand these truths, how can they expect immature children, with nothing in their past experience with which to compare or out of which to build new mental concepts, to gain correct impressions or meaningful information regarding the far-away, abstract phenomena of nature such as Mt. Vesuvius, Crater Lake, or Old Faithful geyser, or to comprehend the great events of strange civilizations of the past and present, just from reading long descriptions from printed pages of dry textbooks? Children must have various types of concrete aids to help them build up a rich background which will serve as a basis for comparing, judging, and acquiring new knowledge.

The perfection of modern photography has placed in the hands of teachers just the means needed to bring this background, this wealth of experiences necessary for efficient growth and development on the part of every child. Through the medium of photography, particularly the stereograph, with its third dimension which seems to transport one into the pictured situation, or the motion picture, with its appealing quality of movement, a concrete knowledge of life and the world we live in is revealed in such a realistic way that it is easily understood by every child. Children today may sit in their warm, comfortable class-

room and be transported mentally to the remotest corners of the globe. They may penetrate the frozen regions of the far north and actually live with "Nanook, the Eskimo," and his interesting family. They may watch him build his snow-and-ice igloo, hop on the dog sled, in imagination, and be carried with great speed over the billowy snow-covered wastes to the hunting and fishing grounds of the native — a thrilling experience indeed. Again, they may visit Japan or Holland, and see first-hand how our foreign neighbors work and play; or they may watch, with great wonder, the boiling, seething lava of Kilauea, as it angrily laps the sides of its great yawning mouth.

Likewise, history is revivified, and children may relive the great events of the past. They may not only read of the great personality of Lincoln, but actually see him as a youth, as a great statesman, see him walking, talking, suffering, even dying a martyr that a great people might be free. Such vivid experiences stir emotions to the very depths. We suffer, we rejoice, we are filled with patriotic love of our country, and the deep and lasting impressions made cannot but affect for the better every individual's thinking, feeling, and acting. Emotional life is stronger than the intellectual. Realistic pictures not only compel us to see but to feel and feel deeply. Indeed, the proper use of visual materials in the teaching process not only brings vividness where before there was only vagueness, but it also enriches the mind and heart.

SUMMARY

This chapter has been developed on the assumption that all means of education which add to the pupil's interest, economize time, and increase the efficiency of learning should, of course, be brought into modern school pro-

cedures. But it should always be borne in mind that it is fundamentally impossible, as well as quite undesirable, to set aside or eliminate the necessity of actual work on the part of pupils. All that educational means can do is to make problems and their solution more full of meaning to children and to provide more means and sources of help in their solution. Visual materials are of value in stimulating thinking, in clarifying the factors involved in the solution of a problem, and in rendering more thorough the mastery attained. The use of visual-instruction materials will not eliminate work; they will not set aside nor lessen the use of textbooks and libraries. On the contrary, visual aids will furnish the stimulus to go to textbooks and library sources of information for such help as the visual materials themselves cannot give.

CHAPTER III

THE FUNCTIONS OF VISUAL AIDS IN THE TEACHING PROCESS

Light is good in whatsoever lamp it is burning;
A rose is beautiful in whatsoever garden it may bloom.

After an educational tool or device has by scientific tests been accepted as of proved worth, the next logical step is to analyze the functions for which it is best adapted. This is also the most important step in any teaching procedure because it has to do directly with the unfolding and development of the child's inner self and his adjustment as an individual to the world about him. It is through the medium of the school as society's main service agency that the "child should be changed from an immature being with meager knowledge and power into a responsible citizen, competent to deal forcefully with the intricacies of modern life."

In the past we have committed the error of mistaking information expressed in mere words for education. Education is far deeper and more complex, and can only be measured as expressed in behavior and ability to do. Knowledge must function in daily living, or it makes no contribution in the larger sense. If interest in pictures is confined to the mere information they convey, their contribution is small indeed. Information should lead to thought and activity; activity should develop conscious strength, self-confidence, and increased command over the knowledge acquired.

NEEDS REËMPHASIZED

Social efficiency implies ability to weigh values and reason logically. But an individual cannot think clearly unless he has the background on which the reflective process is based. This background is made up of an accumulation of mental concepts stored up through years of human experiences. The earlier years of childhood and youth, therefore, must be devoted largely to acquiring new, vivid, realistic impressions. The more definite these impressions are, the clearer and more definite will be the abstract thought process. Again let us emphasize that mankind has three distinct ways of communicating ideas and experiences: by oral language, by written language, and by visual presentation. Ordinarily, these mediums function most effectively in coöperation, supplementing and intensifying one another. The sense of sight is the dominant and, except in rare cases, the most powerful and effective means of conveying correct impressions to the mind. It therefore follows that visual instruction is the most effective way of communicating knowledge, whether this knowledge consists of concrete ideas or of new experiences. There have been in every age a few outstanding educators, from Froebel to Dewey, who have realized this truth and have made desperate efforts to save instruction from empty verbalism and too much bookishness.

From the days of Comenius authors and educators have realized more and more that the mere words of the printed page were quite ineffective with students generally. Other devices were needed to illuminate the text and carve deeper the desired impression. Today popular textbooks, magazines, and even reference works are voluminously illustrated with pictures, diagrams, maps, and charts. This significant step has made the printed page far more intel-

ligible and attractive. These illustrated pages have rendered only a limited service, however, because too often they have been poor in quality, small in size, and even inappropriate, in that they have been mere page decoration with no definite relation to the subject matter of the text in which they are placed. It is vitally necessary that teachers in the elementary grades, and even in the upper division as well, should make further effort to see that additional, larger, and more vivid pictorial materials are introduced, so that correct mental images may be formed. Impressions are often vague because the descriptive words refer to situations and objects outside the realm of personal experiences.

The need of regulating the use of visual materials. First, let us emphasize a word of warning. We must bear in mind that visual instruction is not a new subject, nor yet, from a pedagogical standpoint, a new method of procedure. Strictly speaking, it is only a means employed to aid the more effective operation of the total procedure in the essential method in use in any particular teaching situation. Visual aids — photographs, models, exhibits, charts, graphs, maps, stereographs, slides, and motion pictures — are merely educational tools to be used at the psychological time; for example, to solve a problem, to interpret or enrich the text, or to stimulate interest in new subject matter. Indeed, visual aids are, in a sense, pictorial reference books and should be used in the same way that reference books are used; that is, to meet individual or group needs.

There is therefore a serious need at the present time to control and regulate visual education, and to emphasize the importance of a more pedagogical use of all visual aids. The misuse and abuse of certain types of visual aids, particularly the film, may constitute a real danger to educa-

tional growth. This constant misuse must be attributed largely to lack of knowledge of modern pedagogy and to overenthusiasm regarding the possibilities of new and novel devices. We might liken the situation to a child with a wonderful new toy. He overworks and abuses it until the novelty is gone and it is neglected absolutely.

The prevailing custom in many school systems of circuiting, among groups of schools, sets of slides and motion pictures which have been chosen because they were deemed of educational value from an adult standpoint seems not only contrary to good pedagogy but an actual waste of time and money.

Again, it seems to be a common custom in various parts of the country to find visual instruction given a time allotment on the daily program as if it were a separate subject. Usually these "lessons" are given in the auditorium. Here are gathered great masses of children from all grades, or from several grades at least, actually being entertained, in a sense, by one, two, or more motion pictures which are supposed to contain valuable information that, from an adult point of view, children ought to know. Occasionally, on account of some difficulty at the distributing center, other reels have been substituted for the ones booked, and, as a result, inappropriate and quite startling experiences are often unintentionally presented to the children. For the most part, however, films are carefully previewed and contain excellent educational information, which would be of tremendous value if presented at the proper psychological time in the teaching process. It surely is not the part of wisdom, for example, to require or even permit boys who are wholeheartedly interested in the problem of transportation through the Panama Canal and the operation of the great locks to turn from that interest and assemble with many others in order to be exposed to a wonderful picture

of the "Monarch Butterfly" or "Picking Cotton in the Southern States." They are not interested in butterflies or the cotton industry and probably never have been; so naturally genuine interest is wanting. What is more serious, we are encouraging habits of divided attention and are reducing visual instruction to the plane of entertainment, especially if there is no follow-up work afterwards in the classroom.

True, the pictured experience may be so gripping and fascinating that it may stimulate a new unforeseen interest among some or many. The time may not be wasted exactly, but has it been spent to the best advantage? How much more vital and helpful it would have been to those boys if they might have seen a few colored slides or a good motion picture on the Panama Canal in their own classroom, or even in the auditorium if necessary, somewhere where they and their teacher were alone with their specific needs and interests in intimate informal contact, undisturbed by the presence of others with widely varied interests. In such a natural situation, readiness is there, interest is keen, questions are asked, important points emphasized, puzzling problems solved, and even new problems discovered that call for more study and research on the part of each individual. It may even be necessary to view the slides or the film a second time in order to afford complete satisfaction to the inquiring minds.

In excuse or explanation of this general showing of films, almost invariably it is said, "Films are so expensive, and it requires so much extra effort to use them at all, that it is deemed advisable to give all children the opportunity to get what they can out of them while they are in the building." This seems to be a superficial use of an educational device for the "device's sake" or for the mere information it contains, and not to meet definite needs in a

normal teaching situation. It would be more nearly in accord with sound pedagogy to use no films and to adopt other visual experiences, such as flat pictures and the excursion. This does not mean that there should be no place on the program for mass training at a general weekly assembly in certain fields, as, for example, information of a civic or social nature. This assembly period offers a rare opportunity, and is treated more fully in a later chapter. We are concerned here with the pedagogical use of visual materials that they may fulfil their functions as legitimate, effective teaching devices for developing clear thinking and more efficient learning.

The need of observing the psychological laws of learning. The great danger from an unwise or too extensive use of visual aids is that the experiences essential to real growth and power will not be provided for in the teaching situation. We cannot expose children, or even adults, to pictures, be they ever so appealing and captivating, and delude ourselves into thinking that such exposures and superficial contacts will provide fundamental and lasting results. Psychologically, we know that this is contrary to all laws of learning. While stimulating educative situations are the first concern in the educative process, the second concern is effortful response involving prolonged attention. Let us state in another way what has been said before. Effective learning ordinarily involves a triple mental procedure:

1. *Interest must be stimulated.* Interest is the beginning point of learning. Genuine interest guarantees attention and opens the way for educative opportunities and possibilities. Interest insures a receptive frame of mind.

2. *Effective response is necessary.* Interest may be genuine but only transitory and idle. Whether the educative environment with its rich stimuli and impressions produces

any fundamental educative effects depends on the intensity of the appeal and a concentration of attention deep enough and prolonged enough to call forth reflective thought and reasoning. Through this sustained interest which demands effortful thinking on the part of each individual, there may be kindled a burning desire to know more, and a longing to do and achieve that will persist until perfect satisfaction is accomplished.

3. *Self-expression is essential.* In order that the act of learning may be finally consummated and deep and lasting impressions be made, individuals must be allowed to express themselves and constantly make use of knowledge gained. In other words, when knowledge actually functions in daily living, life is truly enriched, and growth and power are acquired.

It should now be clearly evident that we cannot use visual materials for providing brief, exciting experiences and expect effective learning to result. When we indulge in such a practice the only thing we can hope to do is to encourage the first step in the learning process; this is but superficial and means time wasted unless definite opportunity is given for the development of the next two steps. Effort and work accompanied by interest and motive are vital to learning. We must endeavor to increase the ability to put forth effort to overcome obstacles in order to achieve. This is just the service that visual aids promise when properly used; that is, they present interesting new problems to be solved and then help the student to solve them. Far from eliminating the need for effort, they should be so used as to create a desire in the child to put forth a greater amount of effort to satisfy awakened needs.

DANGERS AND LIMITATIONS

Four serious errors are almost universal in the use of pictures of various types, especially in the elementary grades, and they greatly handicap the potential value of pictures. Concrete discussion of these errors may be worth while.

1. **The use of too many pictures at one time.** Recently a first-grade teacher, learning that the sixth-grade class was going to have a stereopticon-slide lesson on Japan, decided to make the most of the opportunity and so took her group of mere babies upstairs to see the slides. The slides were beautiful, but her pupils seemed to get very little out of them. This was not because interest was not there, for their interest had been greatly aroused by the reading of a little Japanese story. The real difficulty was twofold: first, they were in a new and strange environment which greatly distracted their attention; second, so many pictures were presented, and they were given so hurriedly, that no definite impressions could possibly be registered on their young minds.

This experience was unfortunate for both classes and was of very little educational value to either. Too many pictures presented at one time are practically as detrimental to learning as none at all. The younger the child, the fewer the pictures that should be used at one time. One picture well chosen and presented to meet a definite need is worth infinitely more than a half-dozen hurried through.

Had this first-grade teacher presented one significant slide a day, on her own front board, — a slide related to the definite thing the children were reading about on that particular day, such as Japanese children and their dress, or the jinrikisha in which the Japanese ride, — then each picture might have been studied slowly and carefully, ques-

tions might have been asked, interesting stories composed and written on the board, drawings made, and possibly a bit of dramatization improvised. The little children might have actually lived with the pictured experience and received deep and lasting impressions that would have led to other interesting and valuable activities.

When teachers indulge in presenting lengthy films and numerous pictures at one sitting, they fail to remember that the interest span with little children is very limited and that it varies with different ages and with different individuals. Young children usually lack power to give forced attention; it is an ability that comes only with years and training. Spontaneous attention is the natural childlike form, and ordinarily primary children fail to get much that is really worth while from a motion picture, for example, unless the reel is reduced to two or three hundred feet and simplified in composition. For these children experienced teachers have found that the colored slide for group work is far more effective than the film. The film presents too many different scenes and flies by too quickly.

When we stop to realize that we are viewing sixteen distinct pictures every second and sixteen thousand pictures every fifteen minutes, and that our attention is constantly being withdrawn from the real images of interest to interpret explanatory titles, it is not at all surprising that even adults can remember only a small fraction of what they see in a film, and that usually only hazy impressions can be registered on the mind as a result of seeing a film once. Scenes change so rapidly that there is no time for observation of details or for reflective thought. It is humanly impossible to comprehend and retain so many impressions in so short a time. It is evident then that, for effective teaching, educational films must be short, must not contain too many distinct actions or processes, while

the new elements introduced should be repeated in an effective yet interesting manner. In order to get the best results from the use of films in a teaching situation, not only should the students have a need for the subject matter that the film contains and possess a background from which to build up a comprehension of its message, but they also need to study its contents at least twice, and often a third time, if the subject matter be of a scientific nature. This problem will be taken up again, however, in dealing with the film as a teaching device.

Pictures as a classroom decoration. A brief digression may be permitted to refer to the abuse of pictures in the classroom. Of all places in the world, the classroom should be a neat, orderly, artistic place for children to live in. Pictures may make or mar the artistic possibilities of any room. There are times for appropriate display of good pictures on the boards, but to have walls and boards continuously littered up with long rows and great masses of miscellaneous pictures, often poorly mounted and poor in quality, not only cheapens the value of the pictures themselves, but it is certainly setting a very poor example from an artistic point of view. There are classrooms where strings of pictures of animals, birds, and geographic scenes have hung for months after their usefulness was gone. This is nothing less than an extravagant waste of good pictures, and the general effect seems harmful. Flat pictures, as all others, should be introduced to meet definite needs, and after rendering their proper service they should be carefully filed away for future use. It is also advisable to present certain good pictures as many different times as they can be of any service in different teaching situations. Repetition, with attention directed to the same pictured experience, helps to recall a former lesson and thus revivifies and deepens the impression.

2. **The use of pictures that are poor in quality and complicated in composition.** What are the qualities requisite in pictorial illustrations for teaching purposes? The two most important ones seem to be clearness, or definiteness, of outline and simplicity of composition. Color is also important. Pictures are used mainly to convey correct mental images of persons, places, or things, in order that these new concepts may form the basis for judging and comparing new situations. Teachers cannot be too careful, therefore, to select pictures that convey whole truths, not half-truths. For instance, the other day a child declared that a hippopotamus was no larger than a rabbit. When the teacher questioned the child as to why he had come to this conclusion, he produced an illustrated book showing a rabbit on one page and on the opposite page a young hippopotamus (Fig. 10). Both pictures were absolutely the same size, and both animals stood out in bold relief without one single object in either picture to afford a basis of comparison that might convey the real truth regarding the relative size of these two vastly different animals. There should be in the picture some familiar unit of measurement by means of which intelligent comparison may be made of size, form, and distance. Inferior photography and poor prints are equally detrimental to effective learning. In a

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FIG. 10. Giant hippopotamus

How large is a hippopotamus? This is a poor teaching picture as it contains no unit for comparison

large colored print with a Hollander as the central object, the perspective and proportions were so bad that they conveyed the distorted idea that the windmill and tree in the background were smaller than the Hollander himself.

Color. Color is greatly misused in the hand-painted slide. Commercial houses still persist in sending out erroneously colored slides (such as those showing bright-yellow bananas being picked in the tropics for shipment to America, although it is well known that bananas are always picked green). Color, when truthfully used, adds much to the reality and effectiveness of most pictures. But it is far better to eliminate color unless it is handled artistically and truthfully. Therefore use only slides that have been colored under expert supervision.

Complex pictures. Only pictures that are simple in composition should be used with young children. Complex pictures tend to distract the attention and the interest, thus weakening the value of a picture. While it is true that most adults may apprehend four or five unrelated objects in one glance at a picture, the child, with its limited experience, cannot apprehend so many.

To quote from Norsworthy and Whitley's *The Psychology of Childhood,*[1] p. 100:

> This narrowness of the attention-span may account for some of the difficulty that young children have in reading long words. . . . The psychological law is that only one object of thought, one "conceptual system" can be in the focus of attention at any one instant of time. This is true for all ages, but for the adult the "object" may be a whole system; and the many relationships involved, the conditions which must obtain, the most important associations — all these may be in the margin and color the focal point, whereas with a child, few of such connections can be held. With him, it is one fact, one object, one condition, rather

[1] Naomi Norsworthy and M. T. Whitley, *The Psychology of Childhood.* The Macmillan Company.

bare and unadorned. Any one accustomed to deal with children knows how difficult it is for them to carry in mind more than one point at a time. Ask them in nature study to notice color and form, and attention is given to either one or the other, not to both. . . . Because of this inability to attend to a complex thought as a whole, the younger the child the stronger binds the maxim, "Teach one thing at a time."

3. **The use of pictures unsuited to the mental level of the child.** The error here indicated is committed particularly in relation to slides and motion pictures. Pictures of all types, however, should be carefully selected to fit the mental level of children for whom they are intended. Stereographs and slides that are suited to children in the upper grades are usually entirely unsuited for use in the primary grades. Not only is the content of the pictures too complex, but the titles and explanatory notes are not within the range of comprehension of the younger children. Attempts that have been made by commercial institutions to classify sets of pictures for different grades have often fallen far short of the ideal in this respect. No one but the trained classroom teacher and the pedagogical expert, working coöperatively, has the ability thus to classify pictures. In the motion picture little attempt thus far has been made to meet the needs of children of any age; therefore it is not necessary to dwell on this defect. This is the greatest handicap of the film.

4. **The use of visual aids not adapted to the specific teaching situation.** Educators who have made a special study of the functions of visual aids in the teaching procedure agree that each aid has its particular advantages and also its limitations in the teaching process. Some are effective at one stage of the learning process and are practically valueless at another. For instance, the stereograph is primarily an individual picture and renders its best service during

the study period when pupils are seeking concrete information in solving the problems in an assigned lesson. Being definitely an individual picture, it is unsuitable and practically of no value in group work. Here the slide takes its place and renders its best service. This subject will be more fully discussed later.

GENERAL TECHNIQUE

The preliminary discussion of the need for visual aids and their limitations has cleared the way for our major discussion in this chapter, — How may visual materials effectively function in normal teaching situations? Just as there are three definite steps in the educative process, so we might consider that there are three definite and important steps in developing a lesson — in solving problems and in executing projects. In all these teacher and pupils work in coöperation. (1) *The assignment of the lesson.* The success and educative results of the whole procedure depend on this initial, fundamental step. The assignment involves the creation of an abiding interest in a new field of work or a new problem; it involves the organization of a definite working plan which will lead children into new realms of experiences where new knowledge may be gained and new powers acquired. (2) *The laboratory, or research, period.* Teacher and pupils together consult books, maps, charts, pictures, gather data, ask questions, give reports, until finally problems are solved and satisfaction is gained. (3) *The review.* Here the results of the first two steps may be measured and checked. Experience has shown very clearly that visual aids greatly enhance the effectiveness of these three steps in the development of a lesson. (4) *Entertainment.* Although entertainment is not one of the steps in developing a lesson, it is an im-

portant function of the school to teach the pupils how to use their leisure time to the best advantage.

1. **Assignment of the lesson.** *a. Introducing new subject matter.* Visual aids are valuable as a means of introducing new subject matter, since they may be used advantageously to give a general idea, or to display an appreciative treatment, of a field or topic which is not to be studied exhaustively. For example, if the primary grades are reading "The Dutch Twins," what is more logical and worth while than to introduce a few stereographs, slides, or a film which would convey clear mental images of Holland and its people, and thus give a background for the setting of the story?

One primary teacher hung a large colored picture of a Holland scene on her bulletin board, which was reserved for new interests. This picture showed two Marken children, a boy and a girl, standing near the embankment of a canal. The picture was hung in place before school, without any comment on the part of the teacher, simply to arouse interest. As the children came in, gradually their attention was attracted to the new thing in the room. They went up to examine it more closely; some of them asked questions; others volunteered information. But the teacher took no part in the situation until she felt that the little group had gained all they could by themselves, then teacher and pupils, working coöperatively, began to go deeper into the matter in order to find satisfaction for the various demands that arose. After this degree of interest was aroused and an appropriate background provided for appreciating the people of Holland, the teacher asked if the children would like to read a story about these two Dutch children. Naturally the response was enthusiastic. The next morning the new books were in the hands of the children and the story began.

A similar procedure is just as effective with older stu-

dents. They, too, need a background in order that they may be able to appreciate the setting of "The Lady of the Lake," *The Alhambra, Ivanhoe,* or any other literary selection (Figs. 11 and 12).

b. Giving a general view of a new subject. Again, visual aids function effectively in giving a general view of a new

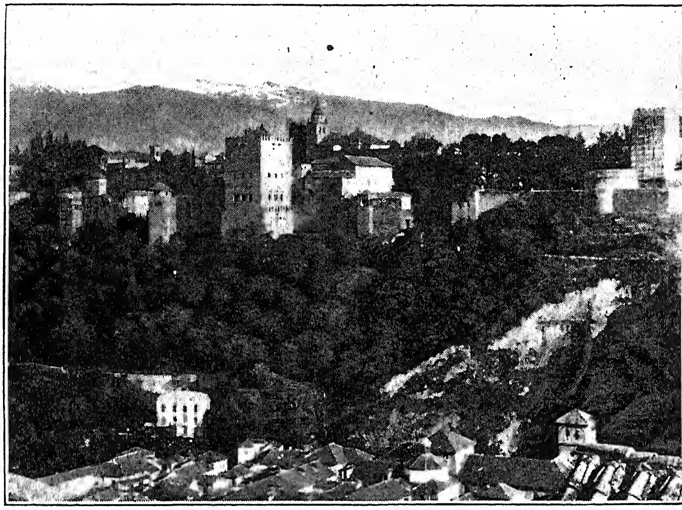

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FIG. 11. The Alhambra, with Granada in the foreground

Such a picture may be used to stimulate interest and establish a background for appreciating Washington Irving's stories of the Alhambra

field or topic whose intensive, detailed study is to be undertaken. Such a beginning serves the purpose of connecting the new subject with the learner's past experience and of stimulating his interest in the new field. For example, if a group is ready for the study of Alaska for the first time, a fifteen-minute motion-picture tour of this northern region will arouse new interest and cause problems to develop which will necessitate detailed study and research for their

solution. When pictures are given for the purpose described above, it is usually necessary to give a second and often a third showing of the picture before completing the development of a topic. This is done to insure clearness and fix the facts in the memory of the pupil.

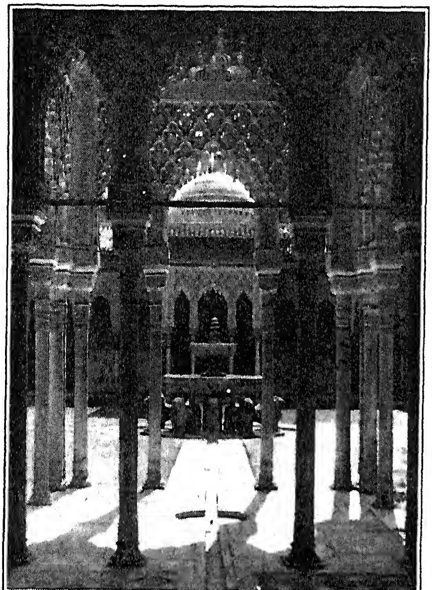

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FIG. 12. The Court of Lions in the Alhambra

2. **The laboratory, or research, period.** In providing concrete information in the preparation of assigned work or in the execution of a given project, visual aids are educational instruments of tremendous value. At this step in our procedure, pupils are led into new and strange experiences while seeking understanding — seeking new mental images as a basis for intelligent judgment and comparison, in order to carry on their activities. Here the various visual aids become absolutely necessary and are used much as dictionaries and reference books are used. At the psychological time in this research period, when the interest is keen and an urgent need for new knowledge is felt by the students, the value of visual aids, such as the excursion, the flat picture, the exhibit, graph, map, and stereograph, in bringing concrete, vivid information, can hardly be overestimated.

If a group of sixth-grade boys in Montana is studying the cotton industry of the Southern states, no description from the printed page or verbal explanation can possibly bring complete understanding or correct mental images. At this point nothing can take the place of the actual cotton boll, or a part of a cotton plant that has been pulled up by the roots when the bolls are ripe. Such a specimen can be handled by every student. They can feel the fiber and the seeds in the tangled mesh, and they can now understand how these little fibers may be transformed into thread and clothing (Fig. 13). But they have only begun! Many puzzling questions come to every mind. How does the cotton grow? What does a field of cotton look like? These boys live in Montana. The actual personal investigation is not possible for them at this time, but the indirect experience that can bring a considerable degree of satisfaction should not be denied them. Now is the psychological time to introduce the stereograph. No other visual aid can meet this need so well. By means of the stereoscope, which shuts out the outside world, each individual, at his leisure, may be mentally transported into a real cotton field (Fig. 14). He sees great fields of white fluffy cotton and living darkies filling their immense baskets. The third dimension makes them stand out so realistically that he is almost inclined to reach out and touch one. The experience is captivating and satisfying, and additional interest is probably stimu-

FIG. 13. A real cotton boll affords an opportunity for careful observation of shape, fiber, seeds, etc.

lated. Why does cotton grow only down in the Southern states? Why can't it be grown in Montana? Physical maps, rainfall, temperature, and vegetation maps must be consulted and read intelligently in order to solve these problems. Various reference books are consulted again. Perhaps graphic charts may actually be made by the students in order to show concretely where the world's supply

FIG. 14. A good stereoscopic picture of a cotton field presents a vivid illustration of the way cotton grows

of cotton comes from. These charts can be used effectively in the opaque projector when individual pupils are reporting to the group the findings of their specific research work. In these various reports the slide becomes indispensable as a means of furnishing concrete information to a group. The large picture may be held before the group long enough for detailed study, and all may concentrate on the same point of interest. Equipped with such a background and understanding, these pupils are able to appreciate fully a film on the cotton industry, and nothing escapes their attention.

Again in history or literature classes certain information may be much desired in the execution of a project such as dramatizing a portion of "Julius Cæsar." The film entitled "Julius Cæsar" clearly shows the Roman Forum (Fig. 15), the arrangement of the Senate, and the dress and customs of that period. To avoid wasting any time, only that portion of the reel that is needed to solve the particular problems then under discussion should be shown.

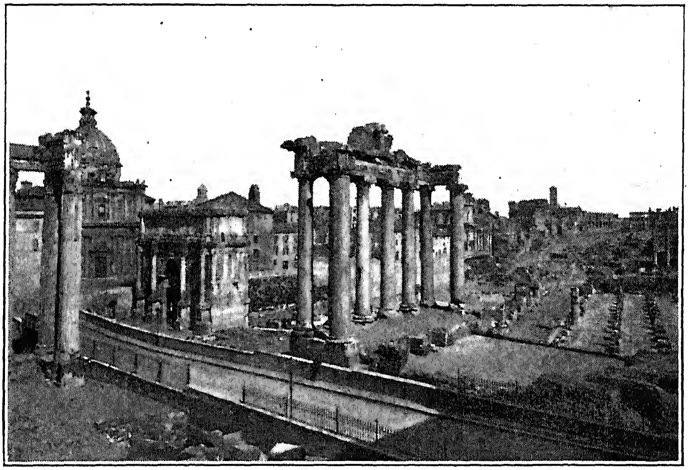

FIG. 15. The Roman Forum

The following experience may be worth relating. The children in a second grade were studying the life and habits of frogs and toads. Pollywogs and frogs at various stages of development were brought into the classroom. The puzzling question came up as to whether the pollywog lost his tail or whether it was absorbed during the process of development. The wise teacher did not offer to explain, but the next day introduced a film called "The Toad," produced by the Visual Educational Society. All stages of development were clearly shown in a most fascinating and

impressive manner. This silent teacher answered all questions satisfactorily for these children.

In an instruction or preparation period it is strongly advised that only a few flat pictures, slides, or stereographs be used at any one time, and that these be studied slowly and carefully with a definite purpose in mind. A film ordinarily should not exceed four hundred or five hundred feet in length, and should bear directly on the specific topic under discussion. The introduction at such a time of any additional subject matter only tends to distract interest and attention and to waste valuable time. If a group needs concrete information regarding the Colosseum at Rome, it is certainly not wise to show a thousand-foot reel of Shakespeare's "Julius Cæsar" just to get a good view of this great amphitheater. Attention may be seriously distracted, and the original motive lost. What is needed is a short reel of, say two hundred feet, showing interior and exterior views of the Colosseum, distant views so that its setting may be appreciated, and probably several historic scenes conveying definite impressions of the original structure and the activities carried on within its arena. The more romantic and complete film might be used later, however, during a review of the topic.

It is also often desirable to use some good picture to illustrate various points in different lessons. For example, a certain picture of the Nile Valley might be shown at one time to give information regarding the Pyramids, and at another time to show the customs and dress of the people (Fig. 16). One picture well studied is worth infinitely more than several hurried through. Too many facts given at one time cannot register in a child's mind, and he is likely to receive only hazy impressions.

3. **The review.** Visual aids make it possible to review a series of lessons or experiences in a concrete, connected

way. The review lesson occupies a most important place in the technique of teaching. It is the time when the important principles or facts are summed up and emphasized. As one writer has so aptly put it, "The object of any review is twofold: it gives a rounded survey of the material previously studied in detail, and it corrects erroneous impressions or misunderstandings." Here the film and the

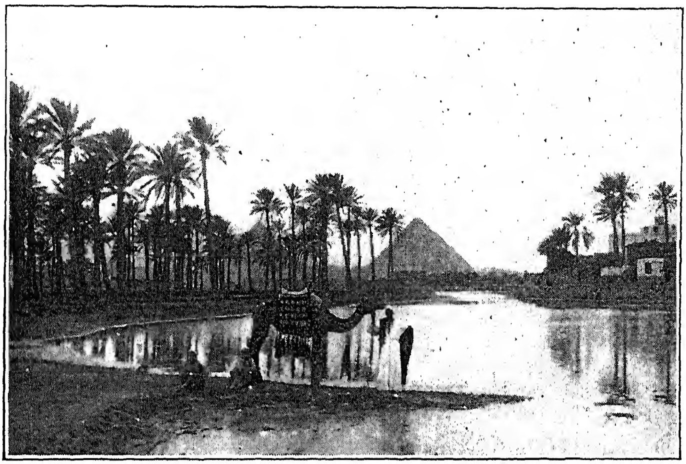

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FIG. 16. Pyramids and the Nile River

The same picture may be used in different lessons to solve certain problems

slide serve our school needs most effectively. No other visual aids can so quickly and interestingly review the whole field of previous study and research, and thus, through re-visualization, permanently fix correct mental concepts in the minds of the students.

A class that has been studying wild flowers for some time has, it may be assumed, taken many interesting excursions into the valleys and hills for first-hand observation and study, while its members have also studied the useful flat

pictures, stereographs, and slides showing the individual flowers that could not be found in the field at the time each was studied. After all this thorough detailed study of individual specimens, the general review is important. At this point a series of colored slides or a film showing all the various flowers growing in their natural environment will not only serve to clinch essential facts, but will also enable students to make comparisons of the different types.

Often a film, such as the one entitled "Brer Rabbit and his Pals," may have a threefold use in developing a series of lessons. This film gives an interesting "close-up" study of the various animals of the rodent family: rabbits, squirrels, prairie dogs, woodchucks, mice, jerboas, and marmots. Introduced at the beginning of a series of lessons to give a general idea of the field of study and research, it would make a wonderful impression and stimulate new interests. Later, during the detailed study periods when the rabbit or woodchuck is studied individually, sections of the film could be run showing those two animals in their natural haunts. Finally, the whole film might again be reviewed and discussed so that comparisons might be made and erroneous impressions corrected. This final review acts as a revival of experiences, and strengthens the appreciation by leaving a general sense of satisfaction. And it is the effective functioning of one or more visual aids that makes this review possible.

4. **Entertainment.** There is still a fourth function to be noted. Visual materials are invaluable as a means of fascinating, wholesome entertainment. It is evident, of course, that the three uses discussed above occur in serious classroom work. The fourth use occurs less frequently and would ordinarily not grow out of or be related to regular classroom work. It does furnish valuable assistance to the school, however, in the latter's function of training for

the right use of leisure. This legitimate responsibility of the public school may be met very successfully through the use of visual aids both during the general weekly assembly and through weekly after-school entertainments which are managed and supervised by the school. During the last few years the weekly assembly has become a very important part of school life, especially in the well-organized city school systems. It is in these large group meetings that the stereopticon slide and the motion picture are probably rendering their best service in many public schools throughout the country. This topic will be discussed more fully later.

CHAPTER IV

TYPES OF VISUAL AIDS

The term "visual instruction" has been given thus far a broad interpretation; it can be given also an equally broad application, and many and varied are the instruments employed. The present chapter may therefore be appropriately devoted to a discussion of the types of visual aids available for educational use, the purposes to which each type is specifically adapted, and how each type may be most effectively handled. In the Appendix sources and costs of supplies will be indicated as fully as possible in view of the fluctuation of prices and the changes in business houses.

The most commonly used materials in visual instruction are excursions, photographs and prints, exhibits, graphic charts, maps and globes, stereographs, stereopticon slides, and motion pictures.

THE EXCURSION

An excursion, in relation to school life, does not mean an outing or recreational period indulged in after school or during a week-end. It should mean, and it will be so used in this discussion, a regular definite aid in the teaching procedure with an important function to perform in the developmental lesson; that is, a lesson in which pupils are taken from the schoolroom to the actual source of information. Here they may personally observe closely, handle if necessary, and gather first-hand information regarding places, objects, and processes.

Contact with nature and the great out-of-doors has always been one of man's earliest and most powerful teachers. Comenius recognized this when he said, "People must be taught to get their knowledge, as far as possible, not from books, but from the earth and sky, from oaks and beeches." No symbol or picture can take the place of the excursion in which intimate association with a place or thing becomes the actual experience of the child. Personal experience is always the best teacher. No one would think of contenting himself with viewing even the most modern type of educational picture if it were possible or convenient for him actually to travel and see at first hand the same things or places. The natural atmosphere and environment add much, and certainly contribute to more vivid and lasting impressions.

Advantages of excursions. The excursion lesson often offers unusual and rare opportunities. In the first place, the formal schoolroom atmosphere is left behind, and teacher and pupils meet on common ground with a common interest. The school-teacher cloak is dropped, and, probably for the first time, the pupils discover that their teacher is a real human being, like mothers and big sisters. Here in the great open there are opportunities for intimate acquaintance, and teachers often discover in some of the most backward boys latent interests and abilities never before dreamed of. There is seldom opportunity for such informal intimate contact and opening of hearts to one another in any classroom. This alone justifies and encourages a more extensive use of the excursion lesson.

In the second place, the various types of excursions vitalize classroom problems and tend to relate school work to life out of school. Thus these concrete experiences form a better basis for motivating school work.

In the third place, the excursion offers unusual oppor-

tunity for good-citizenship training. Where trips are well organized, the class is divided into groups or committees with a leader or chairman of each. Special duties and responsibilities are assigned to each group. Members of one small group may act as business managers. If the class is going to a factory or museum, they must make preliminary trips or write letters to arrange for a convenient time, and they must secure guides or experts to give needed information. Letters of appreciation must be sent after the trip, and so on. Another committee may be responsible for transportation, and arrange for car service, the loan of automobiles for mothers, or special busses. Thus the handling of the excursion develops initiative and responsibility in pupils.

Excursions classified. The educational excursion is a valuable supplement to almost any subject in the curriculum, but is probably most effective in the fields of geography, history, nature study, and allied subjects. It is by no means an elementary activity, but should be indulged in more freely by intermediate, high-school, and college students as well. These excursions are almost unlimited in variety and richness, but may be roughly classified into the following groups:

Trips to parks, fields, or woodlands for close observation of flowers, birds, insects, or trees in their native environment. Nothing else can be substituted and bring the same degree of effectiveness as this personal experience. All the senses are brought into play to intensify the appeal — we see, we feel, we hear, we smell — and all the sensory appeals respond coöperatively in bringing educational and spiritual enlightenment to each individual. Something of the importance of the working together of all the senses is expressed by Emerson when he speaks of his own experiences in the great out-of-doors:

The delicate shells lay on the shore;
The bubbles of the latest wave
Fresh pearls to their enamel gave,
And the bellowing of the savage sea
Greeted their safe escape to me.
I wiped away the weeds and foam,
I fetched my sea-born treasures home;
But the poor, unsightly, noisome things
Had left their beauty on the shore
With the sun and the sand and the wild uproar.

The out-of-doors is always enchanting and rarely fails to call forth the noblest responses in both the child and the adult. This type of excursion offers splendid opportunities for æsthetic enjoyment, which is after all a phase of moral training.

Excursions for the study of the natural processes and physical features of the earth as they affect man and his activities. Within the radius of a mile or two of most schools may be found valuable exhibitions of the works of nature.

A trip to the shore line affords an opportunity to study the action of waves, erosion, and strata of cliff sections.

A climb to a high elevation might contribute to a clearer conception of valleys, river channels, deltas or possible islands, bays, harbors, and the like. Maps and word descriptions are of little value to immature children until the reality of these features has been vividly established in their minds. From a lofty height the student obtains a general perspective which reveals relationships and processes, and these form the basis for future study.

Excursions to industrial institutions. Food, clothing, and shelter have always been man's most vital needs, and his efforts to secure them have caused most of the economic, social, and political disturbances of our civilization. It should be a part of the training of every boy and girl to visit mills and factories in order to gain first-hand informa-

tion concerning the production and manufacture of food, clothing, and shelter. It is not enough to read and to see pictures of how cotton furnishes coats and dresses, or how the humble wheat grain produces bread; a more dramatic appeal is necessary to arouse genuine "thinking" attention.

When high-school students come face to face with human beings toiling in hot, stifling factories, when they actually talk to these workers and see under what conditions they labor day after day in order that people may have bread to eat, shoes and clothes to wear, they begin to understand appreciatively and think sympathetically regarding economic and social problems.

Trips to civic institutions. If boys and girls are to be trained for good citizenship, they must be given concrete experiences in what good citizenship means. Dry, uninteresting lessons in civics and history may be vitalized by well-planned trips to the fire department, police department, city hall, courts of justice, post office, and, if possible, to the state legislature, and to Congress. It is like witnessing a great drama, to sit in the gallery of a legislative hall and look down on well-known senators or representatives in their accustomed places, debating calmly or excitedly, as the case may be, the merits or demerits of some important bill. Such an impressive experience is sure to provoke a keener sense of appreciation of good government, and may greatly lessen the disposition to criticize its organization.

A half-hour spent at a congested traffic corner, studying the difficult problems of the traffic police, would certainly tend to lessen violations of law. Even primary children should be taken to the neighborhood fire department and police station. Many pupils, because of home training, are afraid of these officers. Here they will learn to know these public protectors as friends.

Excursions to museums. Not all communities are blessed with such wonderful collections of educational exhibits as Chicago, Boston, New York, Philadelphia, St. Louis, Milwaukee, San Francisco, and a few other cities; but there is scarcely a city of any size that does not pride itself on a museum of some sort. In many of these public museums children not only have the opportunity to study relics of the past, natural history, and habitat groups, but they hear illustrated talks on particular subjects, such as the customs and activities of the Pueblo Indians of Arizona and New Mexico or the life and habits of seals. This kind of excursion will be treated more fully later in the chapter (see Fig. 27, p. 95).

Trips to zoölogical gardens. Each type of visual experience has its contribution to make. No picture can take the place of personal contact with the living animal or exhibit. As the child sees the lion, the giraffe, and the other animals walking, eating, and stretching, he is able to gain correct impressions of size, build, color, and habits. However, these animals are out of their natural environment, so that the experience is not complete within itself and needs to be supplemented by other visual means. For this purpose the motion picture probably is the most ideal instrument available.

A typical excursion. A concrete example of the organization and handling of an excursion may be of help. Last semester an upper-grade class became interested in the problem of glass — how it is made and its various uses to mankind. In order to get this information at first hand, they decided upon a trip to a glass factory. The following is a brief outline of the procedure.

1. Much research was carried on by individual students. Exhibits and stereographs were freely used.
2. Illustrated reports were given with the use of slides.

3. A coöperative discussion of problems which were not clearly understood and which the class hoped to solve through the means of a trip to the glass works took up one period. These problems were written out: What ingredients are used in making glass? How are necks of bottles put on? How is glass blown? How is hot glass cooled and handled? How is engraving done? What are the laboring conditions and wages of workers?

4. Two students were appointed to make complete arrangements for the trip.

5. By request, the class was divided into small groups of not more than ten in a group, since the factory was not large and the noise was so great that the leader could not make himself heard in a larger group.

6. Trip was conducted to the factory entirely by the student managers. The manager of the factory was introduced to instructor and group.

7. In the open courtyard the manager gave an interesting general talk on the particular factory, what was made, and what should be looked for in each process.

8. The class then fell into the prearranged groups, each headed by a factory leader, and with notebooks in hand started on the tour. The factory visited makes milk bottles, drinking glasses of all kinds, and vases. On account of the background the students already possessed, the processes were better understood, and intelligent questions asked. The pupils were delighted to find men glass-blowers at work, but were informed that human workers would soon be replaced by modern automatic machine blowers.

9. Next day, in open discussion, with notebooks in hand, pupils and teacher pooled their findings, talked over their experiences, and checked up on the solution of the problems.

Results. Valuable incidental information was gained. For instance, they saw great receptacles filled with a mixture of finely ground sand, soda, and lime, and learned that this factory, out in San Francisco, obtained all its sand from far-away Holland. The students handled the mixture, and were given samples of the sand for further use in the classroom. They were deeply interested in the efficiency of modern machinery that could transform this sandy mixture into red-hot, glowing milk bottles that danced out of the molds by the hundreds while they stood gazing at the magic procedure. They were all deeply impressed by the conditions under which some human beings must labor, but were somewhat relieved, in talking to the glass-blowers, to find that the latter had become quite used to the noise and intense heat, and that they worked very short shifts at a time. The pay was rather good, and the conditions were not so bad as an onlooker might think. It was also learned that the girls in the packing rooms worked by the piece, and that an expert packer might actually receive much more in wages than the salary of a classroom teacher amounted to.

Summary of procedure. In order that the excursion or observation lesson may be educationally successful, experience shows that the following conditions should be fulfilled:

1. Pupils should have reached the stage in the development of a lesson where they feel an urgent need and desire to take a field trip.

2. The teacher should be very familiar with the place or thing to be visited and studied.

3. Before starting the teacher and pupils should have a definite purpose and plan.

4. A systematic procedure in study and discussion is necessary while on the ground, in order that definite problems may be solved and correct emphasis placed.

5. The teacher should be responsible for only a small group at one time. Two or three competent mothers can render great service to the teacher.

6. Upon returning to the classroom, the teacher and pupils should make definite use of all information gained. The excursion should not only solve definite problems but should serve as an inspiration for various other classroom activities.

Specific types of excursions. The following excursions have been carried out successfully by several teachers:

1. Two kindergarten boys were trying to build a house big enough for them to stand in. After working several days laying the floor, they could not figure out how to erect the framework for the sides and roof. At this point the teacher took them down the street a block where a new house was being erected. Here they found a pleasant old carpenter who was delighted to tell these little boys just what to do, and even gave them the right pieces of boards to use for their framework.

2. A first-grade class became interested in a store project which was to motivate their arithmetic lessons; they decided to visit the corner grocery to get ideas about just what to do. The patient grocer let them handle different cans of food and told them the price of bread, butter, milk, and so on. This excursion resulted in the building, out of boxes, of a little counter and shelves at the open door of the cloakroom. Realistic pennies, nickels, and dimes were made of cardboard. On the shelves were empty cans, butter cartons, and a loaf of stale bread, properly wrapped. This store operated effectively for many days, and its success was due to the interest stimulated by the excursion.

3. While a primary class was studying about the Pueblo Indian boy, the pupils became interested in pottery, and a small group desired to see if they could not make pottery

as the Indians did. They therefore made two trips to a small one-room pottery, a few blocks away, to learn the proper procedure, and became interested in the mixing and molding of clay. It would have been unwise to take these young children to a large pottery.

4. While studying Persia, a class was taken to visit a business house where Persians sold and mended fine Oriental rugs. The class had read much about the rug industry of Persia and were eager to learn more. This excursion led the class into a detailed study of all kinds of rugs, both foreign and domestic. Later the teacher obtained loans of rugs from local stores and homes. For two weeks the room presented the appearance of a retail rug store. Not only was knowledge gained of kinds of rugs, qualities, and prices, but those children became surprisingly skilled in judging good combination and harmony of colors. This is the type of learning that carries over to the home.[1]

5. An upper grade, while studying the history of transportation, made one excursion to a museum to study models of boats, and another to the waterfront to study large ocean liners and modern freight boats. Here they had an opportunity to study also exports and imports and the kinds of boats needed for transporting various commodities, such as lumber schooners and tropical-fruit boats.

Limitations of excursions. The effectiveness of any excursion depends on the readiness or need on the part of pupils and on the efficient organization and planning of the trip. To allow great numbers of children to wander aimlessly through large museums without a real purpose or an absorbing interest, just for the sake of exposing them to educative possibilities, is a woeful waste of good school

[1] See an excellent picture of a Royal Ispahan prayer rug, beautifully colored — a gem of silk and gold — in Compton's *Pictured Encyclopedia*, p. 3076; also colored plates of Persian rugs, in the *Mentor*, March, 1916.

time. Moreover, the well-planned excursion is not complete in itself. It holds a unique place in teaching, but it should be considered as but a step in the procedure of developing a lesson. Again, in the study of many topics, the excursion is not the best visual aid available For example, when one wishes to study the unfolding of nature's processes, as in the development of the tiny silkworm throughout the cycles of its life history or the intricate details of modern mechanics as found in the great industries, the slow motion picture is far superior to the mere excursion. Here modern photography greatly excels the naked eye, bringing to light, through the film, intricate processes little dreamed of before its advent.

PHOTOGRAPHS AND PRINTS

Flat pictures. Far back in the misty past, prehistoric man conveyed his ideas by means of pictures crudely carved or scrolled on stone. Our first letters were evolved from these primitive symbols. Even today we often resort, consciously or unconsciously, to picture writing in our eagerness to make our mental concepts appreciated and understood by others. How often an enthusiastic salesman will automatically take his pencil and business card out of his pocket, and hastily draw a diagram or crude picture so as to emphasize or explain some idea more concretely by appealing to the eye as well as to the ear. Similarly, classroom blackboards are often profusely decorated with various types of sketches, artistic or grotesque, as the case may be, which indicate a teacher's effort to clarify the meaning of some new idea by making use of pictorial illustrations.

Man's need of pictorial symbols to represent the absent or to illustrate abstract ideas has been met from time to time

in various ways: the primitive first drew on the sand, painted or carved symbols on rocks; later, civilized man represented his ideas in modeled clay, sculptured stone, and through the more skillful use of brush and paint. Modern man has reached the height of achievement in symbolic expression through the development of the photograph.

Although modern science has developed many new and improved picture devices for classroom use, ordinary photographs, prints, and drawings (which are often referred to as flat pictures, in order to differentiate them from the stereograph) are still invaluable as teaching aids. Since a flat picture is a picturization of some definite idea and thus speaks a language common to all mankind, its proper place in the teaching process should not be minimized. It is through the attractive picture that the young child gains its first knowledge of places and things that exist outside his own environment. Through this simple medium a new world is unfolded. What a joy and source of information the picture book has always been for children! Bright pictures invariably make a strong appeal to the smallest child and reveal interesting stories to the immature mind long before the child can shape words with his lips. And when he finally can speak a few words, how the child enjoys prattling about the picture story! Vivid, appealing pictures usually need little explanation.

Pictorial materials, like photographs, post cards, and magazine illustrations, being abundant and generally available, are probably the most widely used of all visual materials. There seems little excuse for any rural or urban teacher not to possess an adequate supply. They are easy to obtain and convenient to use and study closely. They also give a good background for the appreciation and understanding of the newer and more expensive visual aids whose use may very effectively follow in the development of a lesson.

The illustrated textbook. Pictures have long adorned the pages of textbooks, but have been too often totally ignored by teachers. Some of them, however, have been so insignificant in size and so poor in quality that they have rendered very little service as sources of information. A good picture is as valuable as any printed descriptive page in bringing concrete information; to some children it is even more valuable. The one should enrich and interpret the other. Therefore if a picture is deemed of sufficient educational value to find a place at all in a textbook, it certainly should be of the best quality, simple in composition, clear and distinct, and large enough to be used effectively as a teaching device. To devote a full page of an ordinary-sized textbook to a significant picture that is related directly to the text undoubtedly means economy and greater efficiency in teaching.

The increasing emphasis placed on the need of picture experiences is evidenced by the fact that the textbooks which are well illustrated with significant pictures are the ones that are now being adopted and used quite universally throughout the country. It is also gratifying to note that a serious effort is being put forth not only to improve the quality but to make the pictured illustration "an integral and vitally important part of the text rather than merely illustrative of it." Too often pictures have been used as mere page decorations, with little or no definite connection with the text itself.[1] Unquestionably an excellent picture in the textbook is of tremendous value in developing a

[1] A noticeable illustration of this later idea of vitalizing the text through the use of well-chosen pictures is to be found in a few recent series of elementary geographies such as Atwood-Thomas, *The Earth and Its People*, published by Ginn and Company. The authors of these geographies have endeavored to supply picture illustrations that will adequately convey correct mental images to inexperienced children for every new idea described in the text. This is certainly a forward step in making textbooks more interesting and full of meaning for all types of children.

lesson. Every child has a copy before him together with the descriptive text. It may be studied often and intensively. It may also be used effectively for group study as a source of information for the solution of problems that arise during group discussion. For instance, a group was

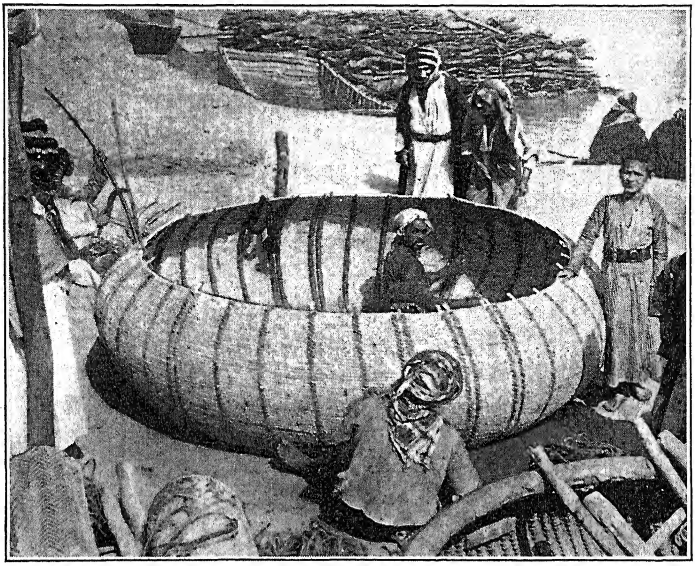

FIG. 17. Building round boats, called koofahs, on the Tigris River

A good textbook picture explains the printed page

discussing the means of transportation on the Tigris River, and there was a great variety of opinions regarding the size of koofahs, those queer big basket boats that are so characteristic of this river (Fig. 17). This was an entirely new idea of transportation to these fourth-grade pupils, and because they had neither read clearly nor observed closely enough, their ideas were very erroneous. Therefore, at this point all were asked to turn to page two

of the text, and together they studied carefully the two pictures given there and began to work out an estimate of the size of the koofahs. First, they counted the number of men in one huge basket boat in the picture. Then a like number of boys were asked to come forward and stand or squat in the same manner as those in the koofahs, while the teacher chalked a large circle about the group, to represent the size of the boat. This circle was then measured with the tape line, and the problem was settled concretely to the satisfaction of all. Had there not been a good picture in the book the descriptive text would have been valueless. It is quite unlikely that the teacher could have found such an unusual picture, and even had that been possible, there would still have been a break in the lesson in order to search for the picture that was needed immediately. Good textbook pictures mean economy of time as well as efficiency in learning.

Procedure with flat pictures. Pictures when used as *sources of information* should be introduced into the teaching procedure as the need arises to objectify and thus clarify the impression upon the thought of the learner. Since the picture is a partial substitute for some reality, it should be treated as material for definite study. It should arouse thinking on the part of the pupil, and the alert teacher will endeavor to stimulate his observing power by skillfully constructed questions and suggestions. Children should be encouraged not only to make careful use of every illustration in the textbook, but also to bring in well-selected photographs or prints that illustrate the new ideas presented in the daily lessons.

Ordinarily flat pictures are most useful in helping to bring concrete concepts to individuals engaged in preparing assigned work. They may also be used for effective group work, however, by means of the improved type of

balopticon,[1] whereby flat pictures may be thrown on the screen and used much as the slide is used. Heretofore the success of this projection depended on the darkness of the room, and this was in many cases a serious handicap. Modern inventions and improvements, however, promise to make possible before long satisfactory opaque projection in daylight. This will be a great boon to primary teachers, who will thus be enabled to throw story pictures on the daylight screen, and also to teachers in country schools that cannot afford to rent or buy slides. Many teachers have collected excellent sets of post cards and other prints of uniform size, which they use regularly in the opaque projector, in teaching geography, history, and science. For this purpose it is best to select prints with clear, definite outlines. Some black-and-white sketches may be improved for projection by skillfully outlining them in India ink.

Classroom collections. It is during early school life that children are building up their initial concepts for future comparisons and judgments and therefore must have concrete information continually to meet their daily needs. It seems not only desirable but absolutely necessary that every teacher should have at her immediate command some sort of a pictorial library in order to meet these needs as they are developed each day. Because of the cost, stereographs and other materials are not always available. Yet every teacher in the country may equip her classroom with an excellent picture library at practically no expense. It takes effort, however, and a will to do. Here is the way.

The educative power of the picture is so universally recognized by industrial, commercial, and transportation concerns, as the most effective means of advertising, that their advertising literature has come to contain the finest

[1] See page 169 for full description of the opaque projector.

and most authentic pictures that can be obtained. The business world always recognizes that only the best quality brings forth the greatest efficiency; therefore business men have spared no effort or expense, but have employed the best photographers and artists in the land to produce pictures for their literature. The originals of many illustrated magazine covers and of advertisements on canned goods hang in noted art collections. Many an American tourist has been agreeably surprised to find the original paintings of the "Gold Dust Twins" and the "Chocolate Lady," for instance, adorning the walls of the famous art gallery in Dresden, Germany. Any teacher may obtain, upon request, from the great railroad companies, steamship companies, chambers of commerce in large cities, and important industrial institutions their advertising literature.[1] From these sources and from the great number of illustrated magazines, such as the *National Geographic*, *Asia*, *Travel*, *Mentor*, *Japan*, *Nature Magazine*, from the rotogravure section of Sunday newspapers, and from many other sources, teachers and pupils working coöperatively find no difficulty in collecting valuable pictures to illustrate every phase of their work.

Mounting pictures. It does not seem extravagant to say that correct artistic mounting of a picture enhances the value of the picture fully fifty per cent. Many a valuable picture has been literally ruined for classroom use because it was inartistically mounted on cheap cardboard or paper. It is likewise most surprising to see how a magazine or advertising picture, when removed from its setting in a mass of printing and properly mounted, becomes a truly artistic thing. If a picture is worth keeping it is worth mounting, labeling, and cataloguing. A very few well-chosen pictures properly cared for are worth infinitely more than a large

[1] See list of dealers in the Appendix, p. 427.

number of pictures poorly mounted or not mounted at all. It is ever quality not quantity that should be sought. The mounting material used for classroom service should not be too stiff; indeed it should be rather pliable, so that it will bend and not break. It must also be of suitable thickness to give it durability, and not so smooth that it will show finger prints badly. To be of real service pictures must be handled often and used intimately by the children themselves. One of the most satisfactory mounting boards is a heavy quality of Cadmus cover paper, which comes in large sheets 21½ inches by 27½ inches. These sheets may be cut in four large mounting pieces or five smaller pieces. The latter size is amply large for pictures from the *National Geographic Magazine*, which is always one of the best sources of supply for flat pictures. Nearly every paper house carries some kind of suitable material called cover paper, but it is often made up in different sizes. For instance, a Buckeye cover paper, of like quality and a slightly different finish, may be purchased from another company. This paper comes 23 inches by 33 inches, and may be cut into eight pieces. It retails at fourteen cents per sheet, or thirteen dollars and fifty cents per hundred sheets. It is economy to have the sheets cut by the selling firm. The price for the cutting is very small, but is usually the same for one sheet or a hundred sheets, as the charge is made for setting the machine. This charge is often as low as twenty-five cents per hundred.

Color in mounting. Often the best artistic taste as to color must be slightly sacrificed for utility. Children's fingers are not always clean, and it is necessary to overcome this difficulty as best we can. Generally speaking, a colored picture should be placed on a mounting that harmonizes with the "middle tone" or the predominating tone in the composition. This cannot always be strictly adhered to in

making large picture collections for school use, but no serious violations will be entailed if a neutral color is used, such as a light coffee color or a dull gray. It is advised that both colors be used in collections. The former is excellent for black and white and is pleasing with the ordinary colored picture; where blue predominates conspicuously, as with deep-blue sky effects, the gray mounting is more desirable.

Arrangement and pasting. Valuable pictures may be ruined by inartistic arrangement in mounting and poor mussy pasting. In order to teach appreciation of artistic values, every opportunity must be utilized not only to set the correct example before children but also to encourage them in the practice of using the best methods in the simplest activities of life.

Children's illustrated scrapbooks in geography, history, nature study, and the like are too often hodge-podges of hacked-out pictures poorly arranged and miserably pasted on pages that are partly covered with illegible writing. The bad habits acquired in such work counteract any good that may come from such a project. Such results reveal only too well the lax ideals and standards of the teacher herself. Children are too often allowed to cut and paste at random without any preliminary training. Yet here is an excellent opportunity for practical art, and the close correlation should not be neglected. Emphasize more and more the old lesson, "Anything worth doing at all is worth doing well." Attempt fewer things and do them well. Children are at school to learn how to do correctly, and no opportunity should be wasted for a practical lesson.

The teacher can save herself much work if she can train the children to do all the mounting of classroom picture collections. One sixth-grade teacher placed all loose pictures, as they were brought in, in large envelopes properly

labeled, to be taken care of during the art period. Then with the teacher guiding the pupils every moment, the pictures were cut carefully close to the edge (this should by all means be done with a paper cutter if one is available), and descriptive titles evened off ready to be placed on the back — not the front — so as not to disfigure the artistic value of the picture. The pictures were then laid on the mounting paper, and with pencil and ruler very light lines and dots were made so that a one-third margin was left at the top of the mounting and a two-thirds margin at the bottom. (This rule is followed by the best authorities, although there are occasions when it is better to mount certain pictures with an even margin.)

The picture was then removed to a piece of newspaper, where paste was applied to the back with a soft brush very evenly with smooth strokes. When the paste-covered picture was again placed on the mount it was easy to place it in its proper position inside the lines and dots.[1] Each picture was then smoothed out with a blotter or clean soft cloth. It was then ready to be placed in the picture press; this process is necessary to prevent curling. In such a lesson period, each child was able to mount well at least two or three pictures.

Waste of pictures. Children must be taught to treasure pictures and books. Every illustrated picture book should be made for a definite purpose and should serve as many individuals as possible. The wholesale destruction of valuable magazines just for the sake of illustrating a paper or a scrapbook that will be thrown away as soon as it is completed is little less than a crime. Hundreds of beautiful colored pictures are carelessly cut or torn out of copies of

[1] In mounting many pictures of the same size, such as the *National Geographic Magazine* pictures, little T squares or frames of cardboard may be used to lay off the mounting margins evenly.

the *National Geographic Magazine* and other magazines, assembled in a haphazard manner in scrapbooks, only to be thrown into the waste basket at the end of the term. Magazines are also mutilated for the sake of two or three pictures, and the remainder thrown into the waste basket.

Every wasted picture would be of value to some library, some visual-instruction center, or some country school. There have been teachers in country schools who had never heard of the *National Geographic Magazine*, and who, when lent copies, were filled with enthusiasm and were eager for more. It would be a magnanimous act and a splendid lesson for children to mount extra pictorial materials and rebind magazines and send them to the interior country districts where children rarely see them. Teachers could easily guide the organization of such materials so as to fit the needs of specific school districts by consulting the state course of study.

It is also a serious mistake to waste the reading matter of good magazines after the picture sections have been removed. These remaining sections can be segregated into individual booklets and bound separately by subjects. The sections may be covered with heavy manila paper and fastened together by means of a stapling machine. If filed away and catalogued, they make an excellent supplementary reference library for the upper grades.

Classroom filing cases. Unless mounted pictures are carefully classified, labeled, and catalogued they are of little value in any school or classroom. Such pictures must be used daily when the need is evidenced, and children must know where and how to meet their needs quickly. Elaborate filing cases or picture cabinets, such as are used in offices, libraries, or visual-instruction centers, are not necessary; simple devices will suffice. One primary teacher had a little case of shelves made by the boys in the manual-

training department. The simple cabinet was about three feet high and contained two rows of shelves about four inches apart and wide enough to hold the regular-sized pictures. Each shelf was labeled and numbered: "No. 3 — Wild Animals," "No. 6 — Indians," and so on. Her pictures were also labeled in the same manner, and the children had no trouble in returning pictures to their proper shelf. Since her class was a primary grade, only a few pictures on any one subject were necessary, and the classification and filing had to be very simple. This teacher had collected, with the aid of her children, the following sets of pictures during one semester: (1) birds of the immediate vicinity; (2) flowers of the immediate vicinity; (3) wild animals; (4) tame animals; (5) the four seasons, including the sports of each season; (6) Indians; (7) Eskimos; (8) Japan; (9) Holland; and (10) story pictures.

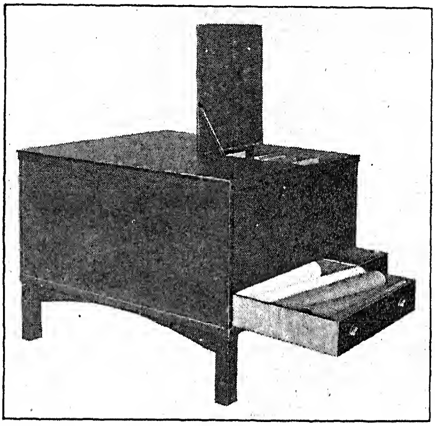

FIG. 18. A sample of a picture cabinet

This type of cabinet is used by the Visual Instruction Department, Berkeley, California. These cabinets are made in the school carpenter shop

Some primary teachers use separate cardboard boxes obtained from the dry-goods store, or large envelopes well labeled, as receptacles for each set of pictures. Boys in an upper-grade history class made a regular filing cabinet patterned after the regular lid-top filing case with two card-index drawers underneath the filing cabinet. This com-

bination rested on a four-legged pedestal about two feet high. In such a cabinet pictures may be filed much as is done in libraries, and students can be trained to act as efficient custodians, thus relieving teachers of all responsibility for the care of the pictures.

Picture collections need constant attention in order to be of the utmost usefulness in the busy classroom. Pictures

FIG. 19. A room in a public library in Newark, New Jersey

Here teachers select pictures for use in their classrooms. Notice that small portable filing cabinets are used

are very likely to be misplaced even in the best-regulated libraries, and the pyramids of Egypt may be found hidden away among the ruins of Rome. It is therefore necessary to have the pictures inspected and put in order at least once a week. A well-organized catalogue should hang at the side of the picture cabinet. The compilation and typing of such a catalogue may be undertaken as a project for a small group of the pupils in the upper grades.

Limitations of flat pictures. The flat picture meets a very great need in the teaching process; but it has many handicaps and limitations. Because of its flatness and lack of depth, it often gives a child wrong concepts and distorted ideas. These errors must be discovered and corrected, if possible, by using actual objects or other improved visual aids.

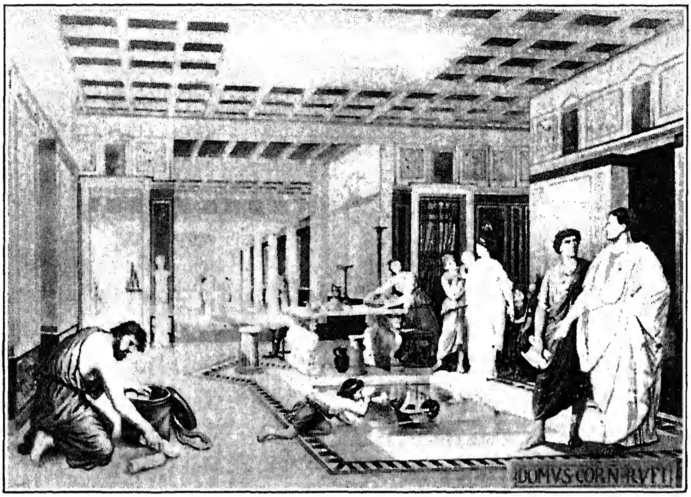

FIG. 20. Interior of a Roman house

This is a sample of the pictures that can be purchased. (Courtesy of the Denoyer-Geppert Company)

Another weakness is color. Unless the pictures are painted by a skillful artist, it is almost impossible to represent their true colors. Prints are likely to be too highly colored or erroneously colored.

Flat pictures lack the power to show changes in processes or activities. They can only reveal a certain momentary situation during a process or a definite circumscribed section of a scene; the rest must be left to the imagination. Therefore, although flat pictures are necessary and most

valuable in all phases of teaching, particularly in the elementary grades, teachers must not only use the most careful judgment to select significant pictures of excellent quality and to use them very discreetly. They must also bear in mind that, because of their limitations and incompleteness in themselves, they do not bring a complete, satisfying experience to immature children. Teachers should therefore put forth every effort to secure that complete satisfaction by supplementing the flat picture with other visual aids; for example, by taking the children on excursions, using exhibits, or other more realistic visual aids.

EXHIBITS, SPECIMENS, AND MODELS

Advantage of exhibits. One of the chief aims of modern education is to make children intimately acquainted with the world in which they live; to teach them to understand and appreciate the interrelationship between man and the earth and all living things. Such acquaintance and understanding cannot be gained by merely reading and hearing *about* things; it must come through actual observation and personal experiences *with* things. Only thus do children gain power to think clearly and to connect knowledge with life. The most impressive and ideal experience is the personal contact with conditions, peoples, and things in their natural environment. But the circumscribed area of a child's world limits the scope of the excursion, and recourse must be had to the next best procedure, — namely, bringing the outside world to the child through exhibits and concrete pictorial representations.

In the exhibit the whole object with its three dimensions and natural coloring is before the child, and he may handle and observe it closely from many angles. The most detailed word description or vivid realistic picture never

brings the same appreciation and definite understanding of a meadow lark, a monarch butterfly, a stalk of wheat, or a boll of fluffy cotton as the real specimen can bring. The most perfect pictures, such as the stereograph and motion picture, may reveal great fields of cotton and wheat and help to make the total experience complete, but they cannot transmit the same definite knowledge that one little stalk of ripe cotton or wheat in his own hands can reveal to the curious child.

Individual and classroom collections. Too much emphasis cannot be placed on the value derived from the individual collection. In the first place, it provides an outlet for the hoarding or collecting instincts of children, induces self-activity, and furnishes an excellent motive for a class project in nature study, geography, or history. In the second place, a child will prize more highly a thing he himself has found for study than an object someone else has found and placed before him for him to look at and study. In the third place, the "felt" need of a specimen, such as a butterfly in the nature-study class or raw wool in the geography class, throws a child on his own resources to explore the field of supply in order to obtain the thing he needs. It also provides a motive for letter-writing, and gives some opportunity for business training. All specimens and exhibits obtained should be carefully labeled and placed in the classroom cabinet or in small boxes designed for mounting specimens.

Teachers may obtain any number of shallow black cardboard boxes from the ordinary dry-goods store. First cut a piece of cardboard so it will fit tightly in the bottom of the box. Mount the specimens of cotton, wool, minerals, or whatever it may be on this piece of blank cardboard. By using a large needle or small sewing-machine awl to perforate small holes in the cardboard and by using a

strong thread or pliable wire, the exhibits may be fastened to this piece of cardboard from the back. The mounted specimen may then be securely placed in the box.

If the specimen is delicate and needs to be protected with glass, two thirds of the cover of the box may be cut out carefully and glass fastened in the inside of the cover by using adhesive tape about three fourths of an inch wide. Broken window glass is excellent for this purpose. In this way classes may have several dozen boxes of excellent exhibits with little or no expense.

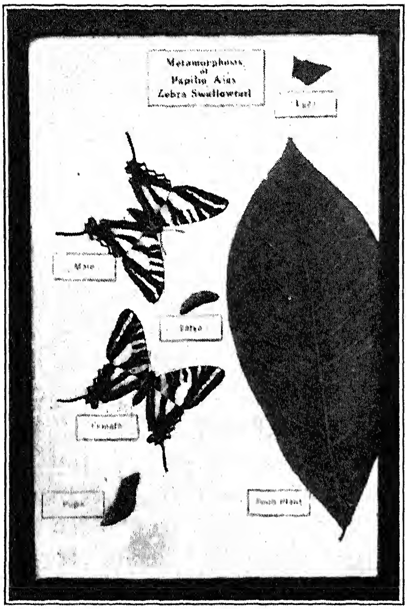

FIG. 21. Mounts for nature-study specimens, such as butterflies, insects, or flowers, may be purchased for a nominal sum

Courtesy of the Denoyer-Geppert Company

Suitable mounts for specimens in nature study, such as butterflies, insects, or flowers, may be purchased for twenty cents and up, according to size, or can be made according to the above direction. A box with a thin layer of cotton on which may rest any fragile specimen makes an attractive and durable specimen case. Sheet celluloid may be used on these small boxes instead of the heavier glass.[1]

[1] Industrial exhibits of all kinds may be obtained for little or no charge from almost any factory, from county fairs, chambers of commerce of cities, counties, and states.

The model. Probably next to seeing the real thing, the model, a perfect representation in miniature, is the most educative visual aid, especially in certain types of studies. In architecture, for example, models of Greek columns, of the Parthenon, and of such structures as bridges, boats, mills, mines, and the like, are indispensable in the classroom.

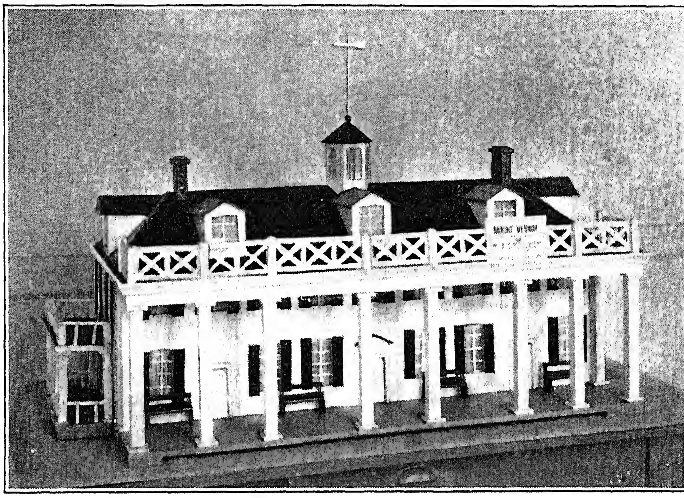

FIG. 22. Mount Vernon, the home of George Washington
Model made by sixth-grade children of Lincoln School, Berkeley, California. A history project

Models of ancient ships, such as Columbus's *Santa Maria*, or of ancient cliff dwellings, such as the Cliff Palace of Colorado, have a tendency to bring into the visual comprehension of pupils concrete truths that other visual aids have not the power to portray. All who have visited the great museums of New York and Chicago and studied there the wonderful models of the villages of ancient and modern primitive peoples have realized vividly the superior effectiveness of such visual representation.

The model holds a popular place in modern education, especially in the project method of teaching. One of the most effective ways of learning is by doing. We all feel reasonably sure that a child knows a great deal more about Eskimo life and customs after he has actually built a model Eskimo village. We are also sure that developing the project necessitated much careful study and research on the part of the child. The "doing" became possible and educative only after accurate mental pictures of the natives, kayaks, sledges, totem poles, and so on had been formed by the child. In total educative effect, however, the completed project far surpassed the pictorial representations which were consulted. Yet each one of them rendered its particular service, and each of them was a necessary step in the development of the project.

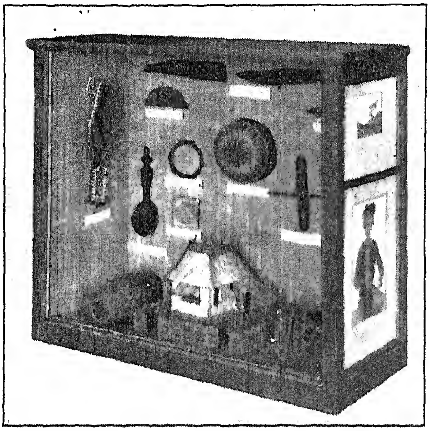

FIG. 23. Ethnology of the Philippine Islands
Exhibit case put up by the Public Museum, Oakland, California

The public museum and the school. Fortunate, indeed, is the city which possesses such educational centers as natural history, art, or commercial museums. There is increasing recognition of the tremendous value to the community of the educational service that is rendered by such institutions as the American Museum of Natural History of New York City, the Field Museum of Natural History of Chicago, the Philadelphia Commercial Museum, the

St. Louis School Museum, the Milwaukee Public Museum, and others. In the near future, institutions of this kind will be considered indispensable as a vital factor in public education; for the museum reaches many people that the library could not reach. Here the foreigner or the illiterate may gain concrete information of history, industry, botany, zoölogy, anthropology, and so on through personal contact with realities.

The idea of the public museum is not new; in fact, it stands as the pioneer in the field of visual instruction. For some time, however, these institutions were "passive or static agents of instruction, disseminating knowledge chiefly to the more or less casual visitor, and were less concerned with imparting information than with the preservation of records, scientific or historical. This viewpoint has passed away, and the modern museum now stands as an aggressive force in education. This is particularly true of the natural-history museums."[1]

In these museums great improvement has taken place in the technique of the preparation of exhibits. Through the development of the habitat-group idea, where an attempt is made to arrange lifelike specimens in their natural settings, an appearance of reality is gained, and the experience is almost complete.

The great museums throughout the country have also developed a system of extension service, similar to the branch-library service, whereby they endeavor better to meet the needs of boys and girls of the public schools. In Chicago this service was made possible in 1911, through the joint efforts of Dr. Frederick J. V. Skiff, director of Field Museum, and Norman Wait Harris, a far-sighted,

[1] George H. Sherwood, "The School Service of the American Museum of Natural History," *Visual Education Magazine*, February, 1922. New York City.

liberal citizen who provided a generous endowment. Together these two men "had analyzed the amazing disproportion the records disclosed between the attendance figures for Chicago schools and the pitifully small number of boys and girls who in the course of a year entered the museum's door. To less than ten per cent of the school population of Chicago was the museum extending its

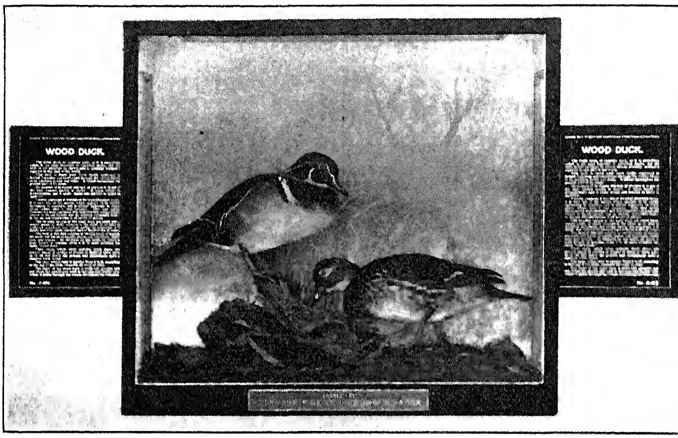

FIG. 24. Example of a habitat group case, showing side labels which accompany all exhibits of the Field Museum

Courtesy of H. N. Harris, Public School Extension of the Field Museum, Chicago, Illinois

hospitality, although no pains had been spared to make alluring the invitation to use and enjoy its rich resources. Even those who did come under the escort of teachers, plainly regarded the occasion as a holiday rather than as an opportunity for serious work. . . . Dr. Skiff declared that if an institution like Field Museum is to make itself a genuine factor in the education of the young, it must not rest content with merely inviting boys and girls into its marble halls. It must actively and aggressively reach out

after them, even into the classrooms. It must depart from its static ways and set itself to visit *them*, day after day, month after month."[1]

Dr. S. C. Simms, an eminent scientist, was selected to develop this extension work. Exhibits and materials gathered from every section of the world have been scientifically labeled and installed in attractive portable cases, and these are daily sent into the classrooms of the public schools. The N. W. Harris Public School Extension of the Field Museum of Natural History has in the course of a few years assembled several hundred of these portable cases. The cases are delivered to the individual schools by means of specially designed motor trucks.

The cases of glass and mahogany which house the exhibits are 24 inches long and 21 inches high. Their depth varies, according to the nature of the contents. For displaying economic exhibits, showing raw and finished products and specimens illustrating various stages of the manufacture, a case 4 inches deep has proved fully adequate. In the treatment of moths, butterflies and other insects, a 7-inch depth accommodates a lifelike reproduction of food plants and environment, together with specimens illustrating the complete life-cycle. The largest of the cases, 10 inches deep, are fitted with top and end lights, enabling students to make their observations from different points of view. This type of case will house habitat groups of birds, snakes, and the smaller mammals.

Throughout the collection the habitat idea dominates. In the majority of the exhibits, the background consists of an enlarged colored photograph showing the normal environment, these photographic backgrounds being preferred as superior in fidelity to the painted reproductions first employed. The foreground of the case is occupied by a strip of sand, rock, mud, grass, gravel, swamp, water — a faithful facsimile of the characteristic haunt of each creature shown — with accessories such as stones, foliage or plants to add to the realism.

[1] L. M. Belfield, "The Visual Idea Functioning through Museums," *Visual Education Magazine*, September, 1921.

Accompanying each case is a framed label printed in easy-to-read type and stating in a brief, interesting way the most important facts about the specimen. Care is taken not to "shoot over the heads" of the children, while at the same time giving scientific facts of real value. Only the simplest of language is employed; indeed, in the newer labels even the scientific name of the subject is eliminated. There shall be nothing, the curator is determined, to confuse the child or deter him from surrendering himself heart and soul to the complete enjoyment of the exhibit.[1]

FIG. 25. Example of the circulating nature-study collection of the American Museum of Natural History, New York

Chicago is only one of several cities that are making greater use of their public museums. Since 1904 the American Museum of Natural History of New York City has been serving the New York City schools with various types of museum materials, representative specimens of mammals, birds, insects, lower invertebrates, minerals, woods, and public-health charts and exhibits. In the last few years this museum has also added to its circulating col-

[1] L. M. Belfield, "The Visual Idea Functioning through Museums," *Visual Education Magazine*, September, 1921.

lections the more valuable habitat-group exhibit, similar to the Chicago portable cases. In 1925 the museum owned 509 group cases.

Besides this service, the American Museum of Natural History owns 75,000 slides and 1076 motion pictures which are lent for educational purposes. The annual report for 1925 showed that the department maintains four trucks for delivering material to the public schools, and it served 5,432,691 children during that year. The entire cost of this service is borne by the museum.

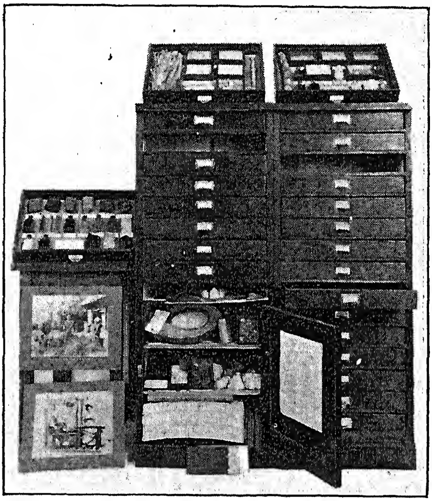

FIG. 26. Industrial exhibit cabinet

This cabinet was prepared by Charles R. Toothaker, Philadelphia Commercial Museum

Probably the finest commercial museum in America is maintained in Philadelphia. Here, under the able direction of Charles R. Toothaker, excellent traveling exhibits, particularly of various commodities of commerce, have been scientifically mounted for use in the schools. These exhibits, accompanied with slides or motion pictures, are sent out into the schools free of charge. Special arrangements are also made whereby teachers may take their children to the museum and receive definite instruction from experts. These lectures are illustrated by colored slides and motion pictures, and lay especial emphasis on the industries and commercial products of the countries which are studied in regular school

work. The lectures are adapted to the comprehension of the pupils who attend, those to the lower grades being couched in very simple language.

St. Louis has long been noted for her excellent school museum. In a large eight-room building are housed twelve thousand museum collections ready for circulation in the schools as they are needed. One principal has written as follows:

> . . . without the educational museum our geography instruction would not be successful. Our teachers know the value of this institution and appreciate its service. Every Wednesday the museum truck stops at our door and delivers the material for the week. A class studying the lumber industry is supplied with specimens of different kinds of wood and a film depicting a Minnesota lumber camp and its activities. Another group is engrossed in the life of Japan, and a box filled with quaint costumes and other articles of dress, together with a number of wall pictures, helps them to gain a clearer conception of the inhabitants of that far-off country. Stuffed specimens of our fur-bearing animals, beaver, marten, muskrat, mink, and others, form the basis of a study of the fur trade conducted by a third class of pupils. There is scarcely any phase of geography instruction that cannot be vitalized by the wealth of material placed at our disposal by the educational museum. But its usefulness is not confined to this subject alone. Nature study, drawing, literature, music, all claim their share of illustrative material from its shelves.[1]

Newark (New Jersey), Milwaukee, Detroit, Cleveland, and even smaller cities like Berkeley, California,[2] are receiving similar services from their public museums. A few other cities are receiving this same type of material from newly organized visual-instruction centers, which are financed and maintained by the school departments.

[1] Carl J. Rathmann, Visual Education and the St. Louis School Museum, *Bureau of Education Bulletin No. 39*, Department of the Interior, 1924.

[2] See Chapter IX ("Organization and Administration of a Visual-Instruction Department") of this book.

It is becoming so evident that the need for such concrete material is vital to fundamental learning that teachers all over the country are demanding that ways and means be provided whereby such collections may be obtained for classroom use. Ordinarily, the excursion to the museum does not meet this need. The atmsophere of the classroom is particularly adapted for study and concentration.

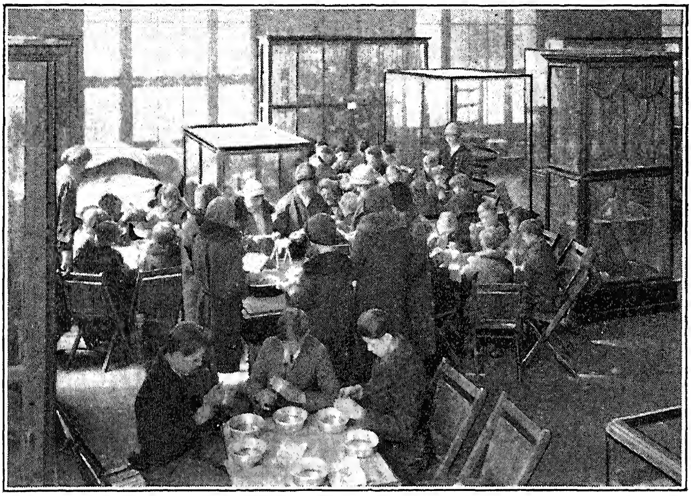

FIG. 27. How the public-school children use the Philadelphia Commercial Museum

Books, pictures, maps, and charts can be consulted while definite study and discussion of the exhibit is taking place. Exhibits sent to a schoolroom often remain there for a whole week at a time. This means a week of close observation and study, whereas a whole day may be almost wasted in tramping through a great museum where there are so many strange things to divert the attention. Moreover, it is impossible to take young children to museums; yet they are the very ones who should have rich opportunities

to see exhibits if we expect them to obtain correct first impressions of what we are attempting to teach.

Use of exhibits. From the foregoing discussion it is clear that exhibits of all types may be used in any one of the various steps in developing a lesson. In the elementary nature-study work, the habitat-group cases of small animals, birds, and plants are invaluable. The portable case may be set on a low table where all may observe long and intently. For example, one class of little first-graders, while reading the story of Hiawatha, became interested in the tree squirrel. Some of the children had seen ground squirrels scampering about in a near-by field, but none had seen a tree squirrel. Puzzling questions were asked, but the abstract answers of the teacher were beyond the children's comprehension. Pictures were produced and studied, but still the needs of the group were not met. Finally, two habitat-group cases arrived from the visual-instruction center. One case showed a mother ground squirrel and her babies just emerging from their underground home;[1] the other, a pair of bushy-tailed tree squirrels in their natural environment on the limb of a tree. These two attractive cases formed the basis for useful work for nearly three weeks. They were the means of

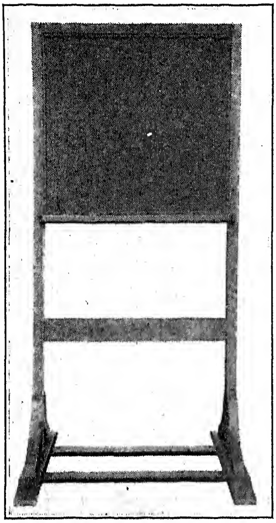

FIG. 28. The Board of Education of Chicago supplies each school with standards on which to suspend the portable exhibit cases

[1] For procedure see also "The Excursion," p. 60, and "General Technique," p. 49.

motivating every subject in the pupils' school experience. These little children not only learned a great deal about the life and habits of squirrels, but they wrote stories and read stories about squirrels. The following is the teacher's account of the development of activities as a result of having the habitat-group cases in the classroom for almost two weeks.[1]

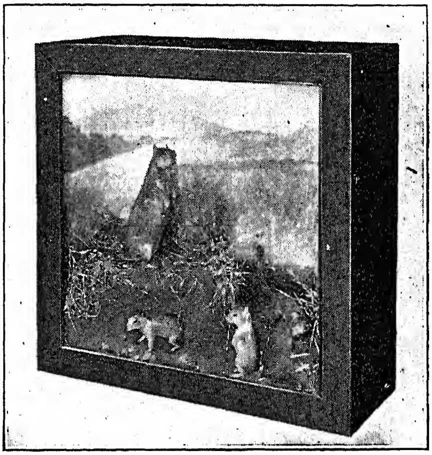

FIG. 29. Habitat-group case of squirrels used in the lesson described

This case was made by boys in the junior-high manual-training class and filled by an expert taxidermist at the Academy of Natural Science, San Francisco. Descriptive matter was placed on the back of the case

1. Children found pictures of squirrels at home and school; compared and classified these.
2. They found stories of squirrels at home or in the school library to be read by the teacher, or, if simple enough, by the child to the class. (This gave gifted children employment for leisure time.)
3. Children composed chart stories about squirrels, their home, food, habits, etc.
4. Children brought in samples of nuts, acorns, seeds, etc. (The squirrels' food.)

Results of interest and correlation:

1. *Reading and language.* An increased vocabulary, much practice in silent reading and in composing whole sentences.
2. *Writing.* Need for practice on letter *q* and capital *S* and *G*.
3. *Arithmetic.* Counting the squirrels in the cases. How many more ground squirrels than tree squirrels?
4. *Civic lessons.* Discussion of the habits of squirrels. Learned to look for and treasure our animal friends.

[1] Franklin School, Berkeley, California.

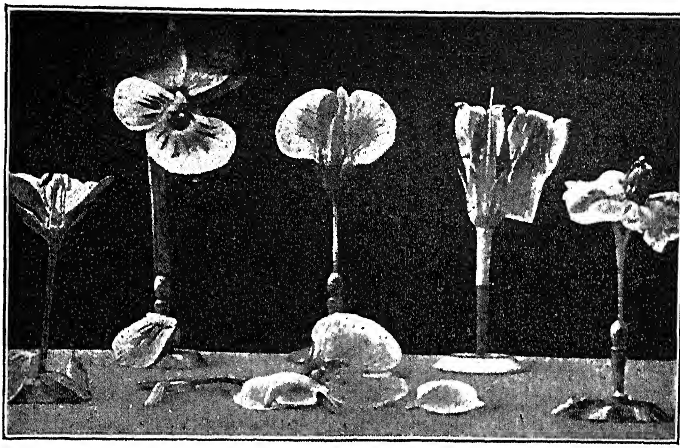

FIG. 30. Botanical models

Petals, stamens, and ovary may be removed for close study. (Courtesy of the Denoyer-Geppert Company)

5. *Art.* Learned to model and draw squirrels and acorns.
6. *Music.* Children learned three squirrel songs.
7. *Physical education.* Learned the game of "The Squirrel in the Hollow Tree."
8. *Memory training.* Learned the poem "The Mountain and the Squirrel."

GRAPHIC AND PICTORIAL CHARTS

Along with the many other modern devices for stimulating interest and making dry facts more understandable there has been developed a new symbolic language commonly known as the graphic chart. "There are possibilities," says Dr. Willard Brinton, "of the graphic presentation becoming an international language, like music, which is now written by such standard methods that sheet music may be played in any country."[1] Generally speaking a graphic

[1] *Graphic Methods for Presenting Facts.* The Engineering Magazine Company, New York.

chart is a drawing which represents a fact, a group of facts, or an idea. The desired representation may take many forms; for example, the size of a square, the length of a bar, the size of a circle, the trend of a curve, the position of a dot, or the picture of an object. It presents a complex situation as a panorama, with each item in its place and the relations and interrelations orderly and definite, thus achieving, and enabling the observer to achieve, a mastery of details.

The graphic chart plays a vital part in every kind of industry and in every department of business today; in fact, it is often referred to as the advertiser's fourth language. Dr. J. Harold Williams has said:

> Graphic advertising, the major salesman for many products, has demonstrated that the attention of the public can be drawn in any direction if the appeal is properly made. It is not verbal descriptive matter, but pictures, which sell toothbrushes, soap, automobiles, furniture, chewing-gum, kodaks, cereals, and other products needed by the public.[1]

Newspapers, magazines, and other publications are making extensive use of this illustrative method to convey statistical and other complicated data.

> Long columns of figures give an impression of accuracy but are lacking in interest for the average reader. Moreover, it is extremely difficult for many persons adequately to grasp the meaning of numbers presented in statistical columns. . . . Charts, then, are a means of objectively clarifying our thinking with reference to facts. They also help to fix the attention of the reader, and are often the sole cause for turning his thoughts in a direction which might otherwise have been avoided.[2]

The universal use of charts in various phases of daily life has made it necessary for every efficient citizen to be

[1] J. Harold Williams, *Graphic Methods in Education.* Houghton Mifflin Company.

[2] Ibid.

able to interpret the significance of the commonly used graphs. The recent introduction of educational tests and measurements into the public schools and the recognition, by authors of textbooks, of the power of the graphic chart in presenting complicated data and making contrasts and comparisons have compelled the educator to familiarize himself with the general methods of graphic presentation. It has thus become an added responsibility on the part of every teacher from the fourth grade up to teach children how to make and use forms of graphic expression in developing their daily lessons.

Many graphic charts which appear in popular magazines and even in textbooks are severely criticized by statistical experts because they are difficult to read or, as a result of optical illusion, convey wrong impressions. Great care should therefore be used, especially with children, in the selection of graphs. The wise, progressive teacher will acquaint herself with the general rules requisite for the making of simple graphs for school use. This knowledge may be gained at summer sessions of a few colleges and universities, such as Stanford University and others, or through the careful study of such splendid books as *Graphic Methods in Education*, by Dr. J. Harold Williams, *Graphic Methods for Presenting Facts*, by Dr. Willard C. Brinton, or *A Primer of Graphics and Statistics*, by Harold Rugg. The present writer is no expert in this field and only offers in the following pages a few suggestions that may lead teachers to appreciate more fully the tremendous possibilities that lie in this valuable visual aid in teaching.

Types of graphs generally used in teaching. For practical school purposes four types of graphs are commonly used in textbooks; namely, the bar, the circle, the curve, and the pictorial chart. These will be discussed very briefly

here. For fuller treatment the reader is referred to the three authorities mentioned above. It seems advisable to caution teachers to avoid the use of complex graphs of all kinds with children. Series of squares, triangles, or circles of varying diameters to show comparative quantities and values are usually deluding to the eye and thus are of little value for any teaching purpose.

Bar representations. Because of its simplicity and possible accuracy, the bar graph is probably the most practical and understandable of the various forms of graphic expression. Bar graphs are characterized by the use of parallel bars or rectangles arranged either horizontally or vertically, but always starting from a base line which represents *zero*. The lengths of the bars represent certain values; if they are colored they are more impressive. The bar graph is used particularly to represent comparative distances, sizes, values, and quantities of industrial output, and so on.

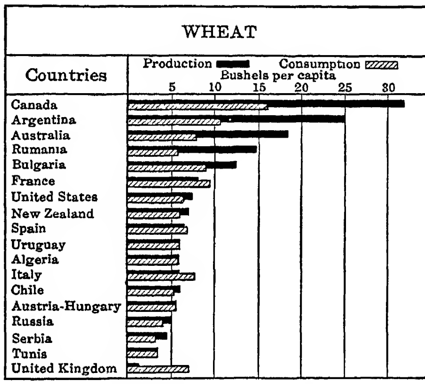

FIG. 31. A bar graph

From the 1921 Yearbook of the Department of Agriculture

Because our eyes are trained to read along a horizontal line on the printed page, the horizontal-bar graph can probably be read with greater speed and accuracy than the vertical-bar type.

Children may be taught how to make and use these effective graphs very early in the grades if they are held

to the simplest constructions. In introducing the significance of such symbolic representation, it might be well to begin with the individual as a basis for comparison. For instance, measure the height of three boys against the blackboard. John measures four feet eight inches; Tom measures four feet four and one-half inches; and Henry measures four feet two inches. Now draw three bars either horizontally or vertically on the blackboard, each bar starting from a carefully drawn zero base and representing accurately the heights of the three different boys.

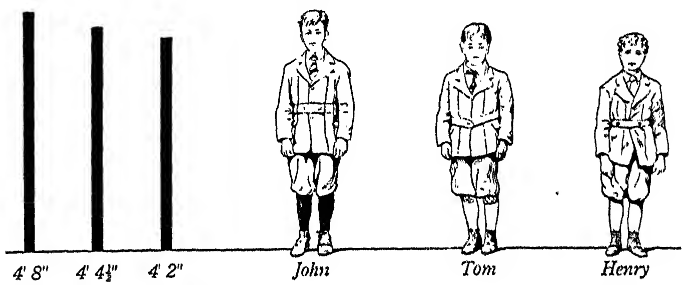

FIG. 32. A simple lesson used to introduce symbolic representation

In this simple way pupils may learn very concretely how bars may represent abstract ideas, — such as sizes of continents, value of crops, or populations of countries, — so that comparisons may be intelligently made.

The following general rules in teaching pupils how to make bar graphs will be helpful.

1. Use a good tin-edged ruler and sharp pencil with hard lead. Ink lines later.

2. Use smooth hard-surfaced paper that is capable of taking both ink and water color easily.

3. Be sure that all data are accurate and up to date before work is begun.[1]

[1] See Harold O. Rugg's article "A Scale for Measuring Free-hand Lettering," in the *Journal of Educational Psychology*, Vol. VI (1915), pp. 25–42.

4. Leaving ample space to the left, construct a series of bars starting at a zero line.
5. Space the bars evenly, not too close or too far apart.
6. Encourage the use of guide lines placed at regular intervals. These greatly aid in mentally measuring the comparative length of the black or colored bars.
7. Do not print on the bars. All printing should be at the left of the zero line of horizontal-bar graphs and at the bottom of the zero line of a vertical-bar chart.
8. Numbers denoting the scale used should appear at the top of the series of guide lines.
9. If pictures are used with bar graphs to attract the attention it is best to place them at the left of the printing so that they do not interfere with the reading of the graph.

The circle representation. Circle graphs are probably most widely used to show comparative distribution of industrial outputs, values of crops, and relative populations. These graphs are particularly valuable for grade children, because the circle always furnishes the idea of a whole, $\frac{4}{4}$, 100 per cent, as a basis for thinking and estimating relative values and quantities. Such graphs go hand in hand with the teaching of fractions and decimals and along with objects like segregated apples, or sets of colored wooden disks, cut into halves, quarters, eighths, and sixteenths, and help the children to visualize the true significance of such proportions.

Circle graphs can give to certain types of information a triple emphasis. The sectored circle, if colored or shaded, shows the component parts in symbolic form; the percentage value, as 25 per cent, or 75 per cent ($\frac{1}{4}$ or $\frac{3}{4}$), written within these sectors attracts the attention in a different way; and by placing the actual value in round numbers under the percentage label, further explanation is given in greater detail.

It must be borne in mind, however, that circle graphs are adapted to convey only general impressions, and are not suitable if accuracy is desired. Children are not capable of estimating the size of angles, and cannot divide circles accurately except in the ordinary aliquot parts, such as halves, fourths, eighths, and sixteenths. The bar graph is better where accurate divisions are needed.

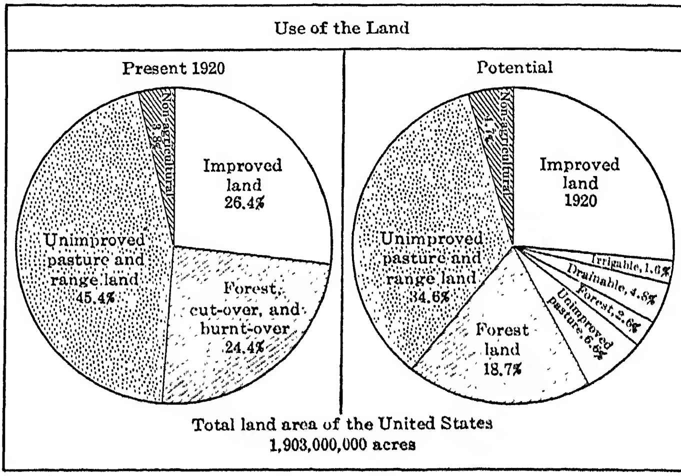

FIG. 33. A circle graph

From the 1921 Yearbook of the Department of Agriculture

The following general rules in teaching pupils how to make circle graphs will be helpful:

1. Every pupil should be able to use the ordinary school compass with a reasonable degree of accuracy. A compass with a pen attachment, such as is used by engineers, is desirable for older students. A T-square, triangle, and protractor (semicircular type), the last an instrument for measuring degrees and laying off angles, are also needed in upper-grade work.

2. All titles should be neatly printed at the top of the graph.

3. All labeling within the circle should be printed in a horizontal line if possible.

4. Avoid the use of concentric circles or a series of circles of different diameters. They are too difficult to compare and are deceiving to the eye.

The curve graph. This type of graphic expression is widely used in the business and industrial world to show

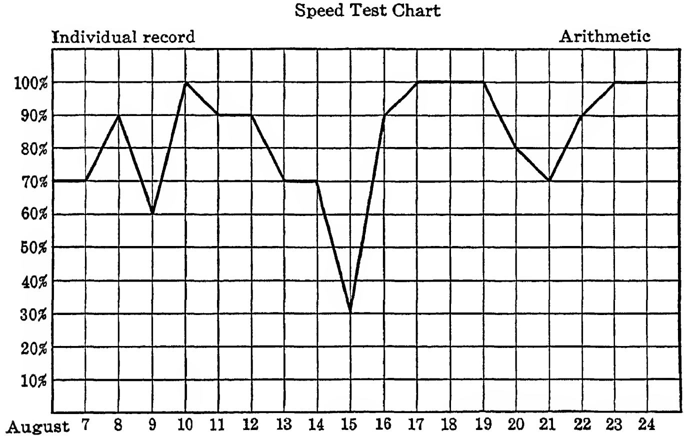

FIG. 34. A curve graph

A copy of a child's individual record chart

trends of facts and variability. It lends itself to a high degree of accuracy, and is therefore universally used by statisticians and scientific workers, whose reports are mainly for technical use. They are often of great value in history, geography, or political-science courses. Teachers and students should form the habit of collecting graphs of this type as they appear in dependable magazines.

In the elementary grades children may be taught to plot simple curve graphs to show their progress and achievement in their daily lessons. To see the picture of one's

daily achievement in graphic form has a wonderful psychological effect. Group charts as well as individual charts are of value in stimulating interest for better work. (See Fig. 34.)

The following general rules in teaching pupils how to make curve graphs will be helpful.

1. In plotting curve graphs, as well as all others, neatness and accuracy should always be emphasized.

2. A hard-edged ruler and a sharp pencil are necessary for accurate work.

3. Children should be taught to measure accurately both horizontal and vertical guide lines.

4. Data should be printed horizontally at the left of the heavy zero line and at the bottom of the base line.

Picture graphs. Of all the various types of graphs which are suitable for classroom use the most appealing, the simplest to understand, and the one that is most enjoyable to make is the picture graph. It is also extensively used by newspapers and popular magazines to catch and hold the attention of persons who are not interested in statistical tables. The picture graph, therefore, although it is not capable of conveying definite information, has tremendous possibilities for educating the general public, particularly by calling attention to comparative situations.

In the elementary grades, of course, statistical facts are of little or no importance and are hard to remember. But it is very necessary that general impressions of a more or less definite nature should be made on the minds of growing children. For example, a child may read that the United States, although one of the greatest consumers of raw silk, is almost totally dependent on her foreign neighbors for her supply to keep her great factories operating; that she obtains 76 per cent of her supply from Japan, 17 per cent from China, 4 per cent from Italy, 1 per cent

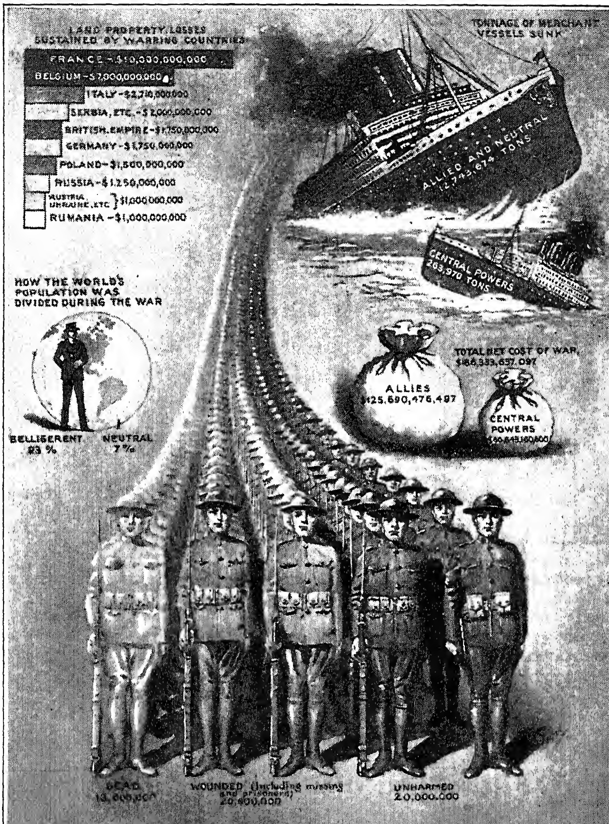

FIG. 35. Does war end war?

An example of a picture graph. (Courtesy of Compton's *Pictured Encyclopedia*)

from France, and 2 per cent from other sources. These data make little impression on the immature mind, and if learned by rote will soon be forgotten for lack of application. The important thing is, that the child should be deeply impressed with the fact that Japan and China are the world's greatest silk-producing countries; that they

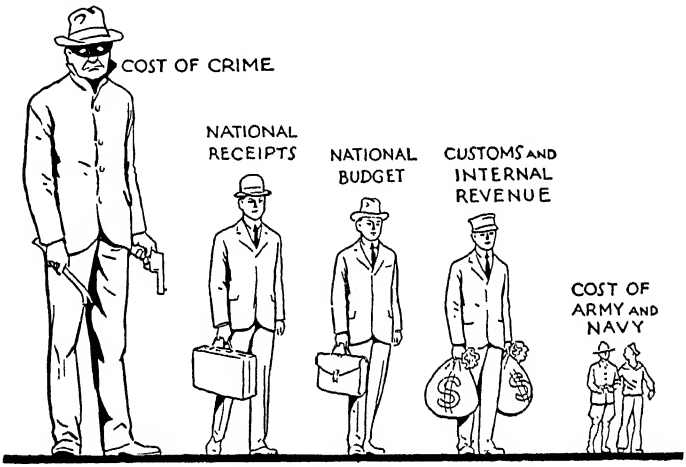

FIG. 36. A valuable form of picture graph

The crime cost is twelve times the price of peace. As the diagram shows, the country's crime cost, about $10,000,000,000 annually, is two and a half times the total ordinary receipts for 1923, three times the national budget for the same year, more than three times the customs and internal revenue receipts, and at least twelve times the annual cost of the Army and Navy. (Courtesy of the *Literary Digest*)

supply the United States with the greater bulk of her raw silk; that Japan is our chief source of supply; and that nations are dependent on one another for important articles, like food, clothing, and shelter. Probably the most impressive form in which to make clear to those children this information is through the picture graph; first, showing five attractively colored silk moths or worms drawn as nearly true to the proportion of 76 per cent,

17 per cent, 4 per cent, 2 per cent, and 1 per cent as possible. Even more impressive, in order to convey the idea of interdependence of peoples, would be the use of pictures of natives of each country, the comparative heights indicating the amount of raw silk which their respective countries send to the United States. In each case the figures should rest on a base line with the percentage printed below each. Picture graphs may be used effectively to accompany circle and bar graphs. If a greater degree of accuracy is desired, it is best to use standardized figures repeated in a series: for example, four ears of corn to represent the world's corn crop, and three ears of corn to represent the corn crop of the United States.

Handmade picture charts. Large picture charts made up artistically by clever teachers possess an exceptional fascination for children of the primary grades. The beautiful colored pictures that appear in nearly every popular magazine — for example, the *Ladies' Home Journal, Good Housekeeping, Woman's Home Companion,* and the *Saturday Evening Post* — furnish a wealth of appropriate pictorial material for almost every conceivable need which may arise in the daily activities of any classroom. These are particularly appropriate for drill charts in the health class and in the arithmetic class, in which young children learn to buy suitable wholesome food for breakfast, luncheon, and dinner. Probably every primary teacher has used these attractive store and cafeteria charts; if not, she will find that their use will bring new life and interest to otherwise monotonous drill. The large brightly colored picture makes a definite appeal to every child; it matters not whether it is of a loaf of bread, an apple, an orange, or a package of cornflakes.

Even though teachers are well equipped with an ample supply of good textbooks, nothing can take the place of

the handmade chart which the children may share in making. These may be arranged with eyelets to hang on the wall or displayed on an easel or tripod. They may also be bound together in a large book and used year after year with different classes. Some teachers have special sets of large charts for every type of activity — the story hour, arithmetic, health, nature, reading, and language.

A few charts which have been used effectively by one teacher are here described; others will be described throughout the book. Each of two charts used in simple language lessons has a picture of a child in the center. On one chart, around the child, are grouped pictures of inviting things to eat and of play activities. On the other chart, around the child are grouped pictures representing his parents, playmates, grandparents, sisters, and brothers, and the flag. The first chart represents the things one likes, and the second chart, the things one loves.

Each child on the two charts is to be named by the children. Questions are then asked, "What does Jane like to play?" "What flowers does Mary like?" Each question is to be answered fully. The same discussion takes place about the "love" charts. After many questions have been asked and answered, the group may make simple rules governing the use of the two verbs.

The same type of lesson may help to solve the problem of teaching "to," "too," and "two." One chart has pictures of action, such as "to run," "to eat," "to play," "to ride," "to sleep," "to sing." The second chart has pictures suggestive of situations "too high," "too low," "too windy," "too greedy." The third chart has groups of two people, two flowers, two balls. Questions are asked and answered; then original sentences are offered by the group, following which simple rules are formulated.

Four charts had been prepared representing four seasons of the year. The suggestive pictures on these charts were a child carrying a bunch of violets (spring), three children playing on the beach (summer), boys playing baseball and caught in a sudden fall shower (fall), and boys playing in snow (winter). Pictures of action were intentionally chosen as conducive to the telling of original stories.

The charts, beginning with spring, were presented successively, and the question "What time of the year does this picture represent?" was asked as each chart was shown. When the right answer was given, all engaged in an open discussion regarding the season. A phase of nature study was introduced when the signs of spring were mentioned, such as flowers, budding trees, and the coming of the birds.

The chart for summer touched on vacation trips, a subject always sure to arouse much interest and to call forth much spontaneity.

Autumn, or fall, brought out many interesting stories of unusual rainstorms that the children had seen in the East or various other parts of the country.

Much enthusiasm was shown over snow and the winter sports. The teacher read the "Story of a Snowflake," from which later developed an art lesson in folding and cutting six-pointed snowflakes.

After the separate discussion of the seasons the group learned the names of the seasons and the months in each season.

During the discussion the teacher inserted several short poems appropriate to the season, as "Rain in Summer," "Snowflakes," and "Autumn."

The chart of the particular season to be studied was then shown a second time, and the children were asked to tell

stories suggested by the picture itself. Much thought and imagination were shown in the story-telling. The group offered kind criticism and helpful suggestions to add interest to the stories. The children in the picture were named, their homes considered, and relatives, such as brothers and sisters, suggested. Each story contained much conversation which kept the group interested. In conclusion the group learned a short poem for the particular season studied.

Use of graphs. Like all other information, it is best to introduce the simple rules for correct graph-making as the need arises in developing certain problems. For instance, if a group is developing the oil industry and reads that the United States produced 30,870,000,000 gallons of petroleum in 1924, while Mexico produced 6,278,000,000 gallons, and that the world's output for that year was 42,463,000,000 gallons, it stands to reason that the abstract information will make little or no impression on the average mind. Enormous numbers are bewildering, mystifying, and meaningless until they are reduced to the realm of understanding by objectifying and visualizing them in symbolic or graphic form. This is a case where facts do not speak for themselves. At this point pupils will appreciate the use of a significant bar or circle graph (see Figs. 31 and 33), and will enjoy learning how to make and label charts. Having learned to make them, the pupil will find they may often be used to "put over" to fellow students a point of view, an idea, or a group of facts.

Graph-making in the upper grades should correlate very closely with drawing and arithmetic. The making of graphs offers a splendid opportunity for the pupil to apply his knowledge of printing and his feeling for harmony of color. Color adds greatly to the vividness of the story of a chart, and makes it much easier to read.

Cartoon. Another pictorial appeal which has taken the world by storm the last few years is the cartoon. The modern cartoonist holds a unique place in political life today and has a wonderful power for arousing interest and spreading propaganda. Like the graph and all other charts, the cartoon provides a unique means of telling a definite story, which is appealing and understandable, in the briefest time and the smallest possible space. Many messages could not be "explained" to the public in any other way.

FIG. 37. Another bobbed-haired victim

From a drawing by Fox in the Rochester *Democrat and Chronicle*. The cartoon is a unique means of telling a definite story. (Courtesy of the *Literary Digest*)

There ought to be a legitimate place in every class in history and economics for appropriate cartoons.[1] They are an effective means of stimulating interest in new problems, particularly those of a political, social, and economic nature. Teachers who have not had the opportunity to see the Social Science pamphlets which are being used in the Lincoln School of the Teachers College, Columbia University, will be interested in looking over this material to see how Dr. Rugg and his co-workers have made

[1] Daniel C. Knowlton, *Making History Graphic*. Charles Scribner's Sons.

effective use of graphs and cartoons. Throughout this series they offer much resourceful material.

Summary. The line graph, cartoon, and pictorial chart are not mere illustrative aids but valuable sources of information, and they have definite functions to fulfill in all modern teaching. A particular value attaches to the graph or large picture chart which pupils and teacher together construct, but many valuable graphs and charts may be procured without cost, from chambers of commerce, the United States Department of Agriculture, and various commercial houses.

MAPS AND GLOBES

Advantages of maps and globes. Maps and globes are valuable pictorial materials to be used in the study of geography and history somewhat as the dictionary is used; that is, for purpose of reference. Maps and globes hold a unique place in teaching: there is no substitute for them. They help students to localize and visualize realities in certain subjects as nothing else can do. They are as indispensable in teaching the social studies as books themselves. Indeed, maps were made and read long before books were printed. Maps guided the ancient mariner thousands of years ago as he plied his crude craft along the shores of the Mediterranean Sea. From those ancient days to the present, maps and globes have developed from crude diagrammatic charts, which endeavored to outline the small area of the then-known world, to the wonderful scientific and artistic picture of the great world today.

Map-making has indeed become an art of great importance. By skillful arrangement of colors artistically shaded and accurately labeled with significant symbols, the modern map tells almost a complete story. Students clearly see

RELIEF-LIKE TYPE OF PHYSICAL MAP
Courtesy of A. J. Nystrom & Co.

great stretches of green lowland valleys, of dry, barren deserts, or rolling upland plains sloping up to great rugged mountains that seem to tower high above all else. Without the need of a single printed page, the interesting story of the geographic conditions under which peoples live throughout the world may be clearly portrayed. The rainfall map reveals almost as vividly as a photograph that the Amazon Valley has an extremely wet climate, and the temperature map tells the reader that the climate here is always hot; and so with a little reasoning he comes to the conclusion that heat and moisture together produce luxuriant growth. It follows that the Amazon Valley must be a country of very dense vegetation, known as the jungle. The story is so evident that the pupil need not consult the vegetation map unless he desires to verify his judgment.

Photographs are invaluable in bringing correct mental pictures of a geographic environment in terms of human response. But the photograph can show only limited areas, whereas the map reveals geographic conditions in extensive regions all over the earth. The camera picture portrays concretely and realistically a definite circumscribed locality or habitat; the map carries the story further by explaining how such an environment came to be, because of existing geographic conditions and relationships, such as location, surface, and climate.

The world map may further enlighten us by revealing the entire extent of vast areas having like geographic conditions. In the photograph we may see a Bedouin and his camels traveling across a few miles of the great Sahara Desert in northern Africa. A map, with its symbolic areas, shows miles and miles of desert country stretching from the Nile River almost to the Atlantic Ocean, relieved here and there by fertile oases, and interspersed with great highlands.

So the map or globe continues and explains the story of the photograph and printed page. Each supplements, interprets, and enriches the other, and their coöperative use is essential to the complete satisfaction of the learner.

Kinds of maps and globes. Maps and globes have long been recognized as essential to the study of geography and history, but in the past they have been used mainly for locating political units, cities, rivers, mountains, and the like. Maps were more or less bewildering masses of lines, dots, and color to most children. There was no interesting, illuminating story revealed in the map itself. Cities were black dots in a certain political division; rivers were little crooked lines that rose in certain highlands and emptied into certain bays, seas, or what not.

The recent, larger conception of the subject of geography is leading teachers to place more and more emphasis upon man's response to his physical environment, and consequently they are making a more comprehensive use of all types of maps. The modern school map is now studied with new meaning and significance. Children are taught to realize that maps, like words, are symbols of ideas and are not intelligent to individuals unless they are trained to interpret them aright. Just as the little child learns to interpret the symbol "c-a-t" as the sign for its pet kitty, and immediately sees the real kitty in its mind's eye when the word "cat" is written on the board, so, applying the same law to map-reading, children may learn to see interesting realities and stories back of those heretofore abstract lines, dots, and color. Teaching from abstract maps before ideas have been connected with them has the same effect as teaching mere words before children know what they represent.

The improved maps of today make the teaching of geography alive and stimulating. Children are now trained

to see the river that formerly meant only a crooked line with a source and mouth, as the home of interesting people doing interesting things. Instead of a waving line labeled Tigris River, he sees queer Arabs huddled together in huge basket boats paddling their way down the stream; or Egyptians struggling to raise water by means of crude buckets to irrigate the beautiful fields of cotton or grain that join the dry deserts on either side of the Nile. When he traces the Nile River winding its way to the sea, he sees, with second sight, back of that line a narrow ribbon-like valley of fertile fields and, here and there, ruins of ancient cities and monuments. The black dot labeled Cairo recalls to his mind a densely populated city with its many mosques with fantastic minarets, its narrow winding streets filled with busy bazaar merchants, water-carriers, and donkey and camel drivers. Instead of seeing only a deep dark-brown spot in south central Europe, the trained eye sees towering snowcapped mountains rising from deep, narrow mountain valleys, where the industrious Swiss people are cultivating the soil or tending their goats and cattle on the steep hillsides. The central part of the United States no longer means just a level plain, but acres and acres of waving cornfields and thousands of hogs almost ready for market. So pupils must be taught early in school life to read the story of maps as they do the story of the printed page or the photograph.

Types of globes and maps for grammar-school use. There are several types of maps which can be used effectively in the grammar school. The following discussion will bring out the advantages of each.

Relief globes and maps. A globe is a three-dimension model of the world. Because of the tremendous size of the earth it is impossible to make a relief map or globe to a scale even approximately correct. Nevertheless relief

globes and maps are invaluable in bringing, especially to younger children, a more correct impression — a general truth — of surface conditions.

The realistic model with its actual raised surface permits pupils to feel the elevations and depressions as well as to see the relative shapes and sizes of the physical features of the earth. Most of the relief globes are modeled

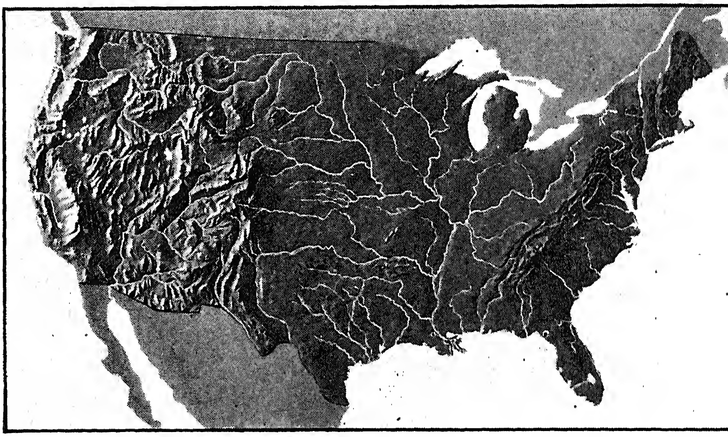

FIG. 38. A realistic model with its actual raised surface permits pupils to feel the elevations and depressions, as well as to see the relative shapes and sizes of the physical features of the earth

from a plasterlike substance and must be handled with care. The newer relief maps, which are actual miniatures of continents, are, however, of light weight, and yet as hard as porcelain. They can easily be cleaned with soap and water. The maps themselves are printed on a durable paper, and then pasted on strong pulp board. They then go through a hot press, in which the embossing is done. After this they usually go through a cold press in which the depressions on the back of the maps, caused by the embossing, are filled up with cork and plaster of Paris.

These maps are well mounted in wooden frames, and can be purchased singly or in sets. They are about 47 × 43 inches in size. Cabinets may be purchased to hold sets of these relief maps.

The most successful geography teachers of today are recommending that relief maps and globes be the first type to be used, and that they be freely used all through school life.

Physical maps and globes. Next to the raised relief map, the physical map and the globe are the easiest for children to read. These should be simple and definite, showing natural regions with as few political lines as possible. The physical maps now in common use are really graphic pictures of the earth's surface. They are of two types: (1) The graphic-relief series of physical maps indicate height of land above sea level by shades of light and dark (see map opposite page 114). This type of physical map attempts to show natural topography or roughness of the surface and has the appearance of a photograph of a raised relief model. (2) A newer type of physical map is colored according to the contour-layer system, which shows the area between each contour interval in a separate color. The scheme of coloring adopted by map publishers varies, but in general the lowest lands are shown by shades of green, and the higher lands by yellows, browns, and reds. The ocean depths are shown in different shades of blue, bringing out clearly the continental shelves and the deeper parts of the ocean floor. (See map opposite page 120.) (3) The newest type of physical map is that which shows natural regions. The regions are based on the most important surface-relief features of the earth. The maps, through a new scheme of coloring, give a clear picture of the way in which mountains, plains, uplands, and plateaus are distributed over a country, and of their relation to one another.

All physical maps are constructed to show surface conditions; therefore all physiographic names should be shown boldly, and names of cities, countries, and states should be shown in lighter type. Important names only should appear.

Political globes and maps. Political globes and maps show political boundary lines of countries, location of rivers, lakes, mountains, bays, seas, and cities. They might be called map encyclopedias for locational geography.

The flat political map renders a very limited service to young children, chiefly because physical environment is not indicated. The combined physical and political map is more practical for ordinary school use than the single political type. In such a combination children may conveniently see how the resources and activities of peoples of similar natural regions of the earth are likely to be similar, regardless of the territorial boundaries which separate groups of peoples into political units.

The new series of Atwood's physical political maps are a notable achievement in this more modern scheme of map-making. These maps display one large regional political map containing all necessary political divisions and locations; appended to the major map are four supplementary reference maps, showing relief, rainfall, population, and land utilization. This idea of displaying five complete maps on one mounting, in one field of view, means great economy of both time and energy. It enables the teacher to illustrate in a comparative way the interplay of physical, political, and economic forces which are so fundamental in the study of human geography. (See map opposite page 126.)[1]

[1] As already explained, the great contrast in the natural regions is due to the difference in relief; in a general way the dark-brown colors are used for greater relief, the greens for lowlands, and the intermediate shades of brown and green for the intermediate areas of relief and lowland.

A PHYSICAL MAP COLORED ACCORDING TO THE CONTOUR LAYER SYSTEM

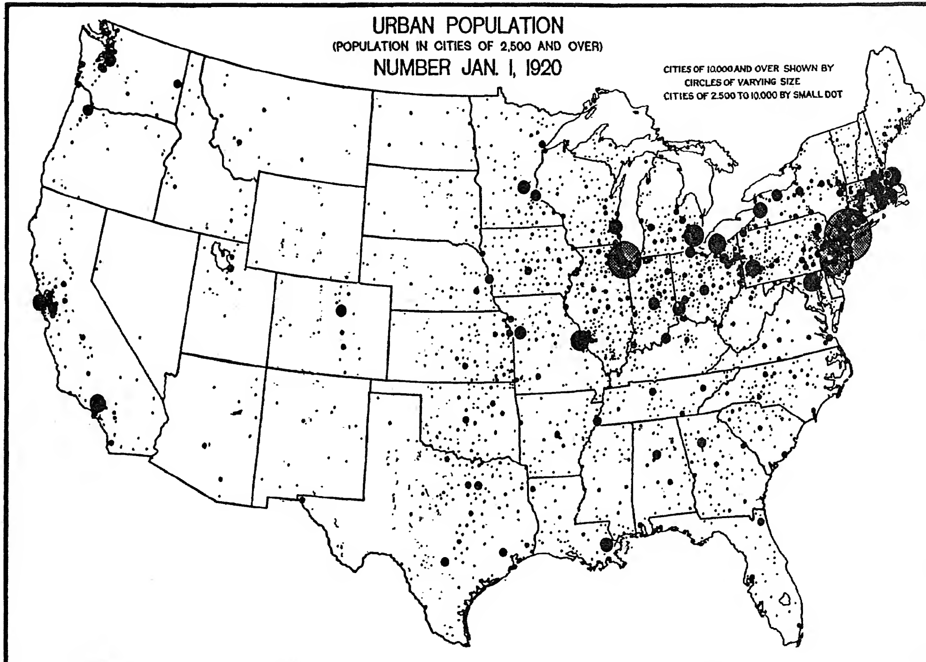

FIG. 39. A population map. (Courtesy of the United States Department of Agriculture)

Population maps. Population maps show where people live. Map-makers have various ways of showing distribution of population. Some use black dots, one dot indicating one hundred thousand people; others use shaded areas, indicating by numbers about how many people there are to a square mile in certain areas. Both styles are easily read, but the dots seem a little easier for children to comprehend.

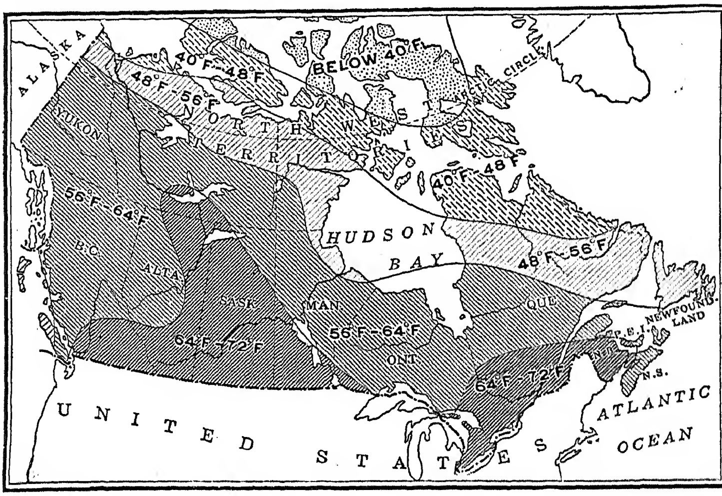

FIG. 40. Map showing the average summer temperatures in Canada

Temperature maps. Temperature maps play an important part in the teaching of modern geography, as they reveal one of the important reasons why people live where they do. The approximate temperature of localities is usually made known through masses of color or through black-and-white shaded areas. Thus the regions all over the world having like climatic conditions (which are due for the most part to latitude, altitude, winds, and nearness to bodies of water) may be quickly distinguished. Where the degrees of temperature can be placed on the shaded

AN EXAMPLE OF A POLITICAL MAP

area itself, the reading is simplified and time is saved. A more accurate estimate of temperature may be shown by the use of isothermal lines on a physical map.

Rainfall maps. Temperature and rainfall maps supplement and enrich each other. They are similar in appearance and construction, and one is as important as the other. One shows the distribution of heat, and the other indicates

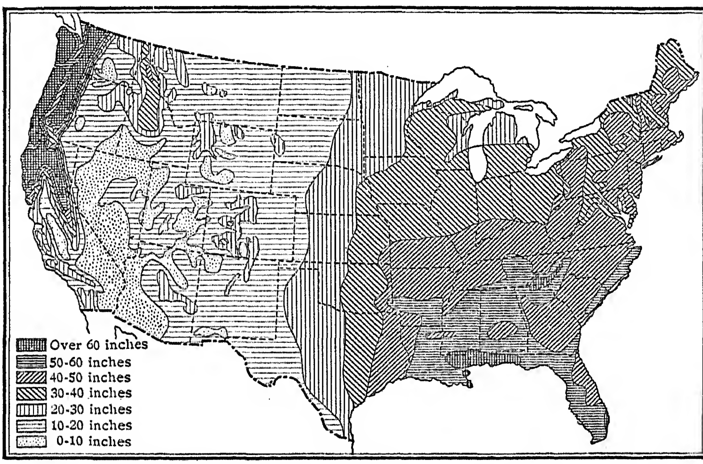

FIG. 41. Rainfall map of the United States

the amount of rainfall per year. The black-and-white masses designating the average number of inches of rain per season or year portray a simple story of possible industrial life throughout the world.

Vegetation maps. Vegetation maps show the plant life of the various geographic regions of the world and reveal the effect of climatic conditions. The color scheme used in these interesting maps shows regions of tropical forests, coniferous forests, grasslands, swamps, and deserts of the world. A close study of vegetation maps reveals

the probable resources and the chief activities of the people of different natural regions.[1]

Products, or economic, maps. These are very useful in the upper grades to show resources. Teachers will find Finch's products and industries maps of the United States [2] helpful in teaching commercial and economic geography. The

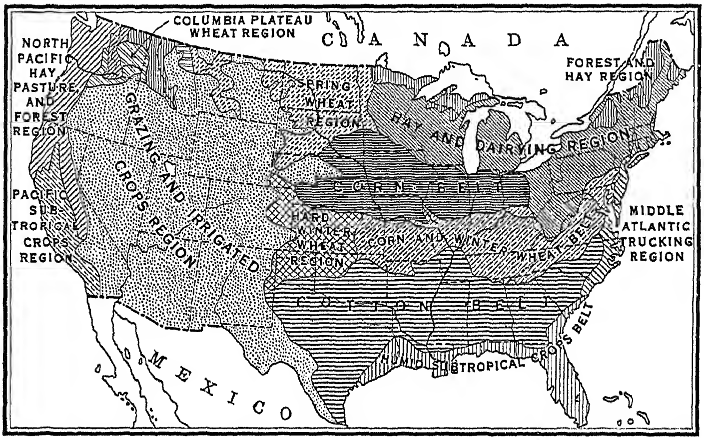

FIG. 42. Map showing agricultural regions of the United States
Courtesy of the United States Department of Agriculture

series contains thirty-four separate graphic maps showing the location or distribution of more than fifty individual products and industries. These facts of distribution are supplemented by more than fifty-five bar graphs showing the relative importance of leading countries and leading states in various lines. Teachers will also find the black-

[1] The Philips Comparative Wall Atlas maps contain excellent vegetation, rainfall, temperature, and population maps. Since the series forms a logical sequence of cause and effect, frequent comparison between two or more maps is necessary, and the maps should be arranged in the classroom so that two or even three maps can be simultaneously displayed. These maps may be purchased from the Denoyer-Geppert Company of Chicago, Illinois.

[2] Published by A. J. Nystrom & Co., Chicago, Illinois.

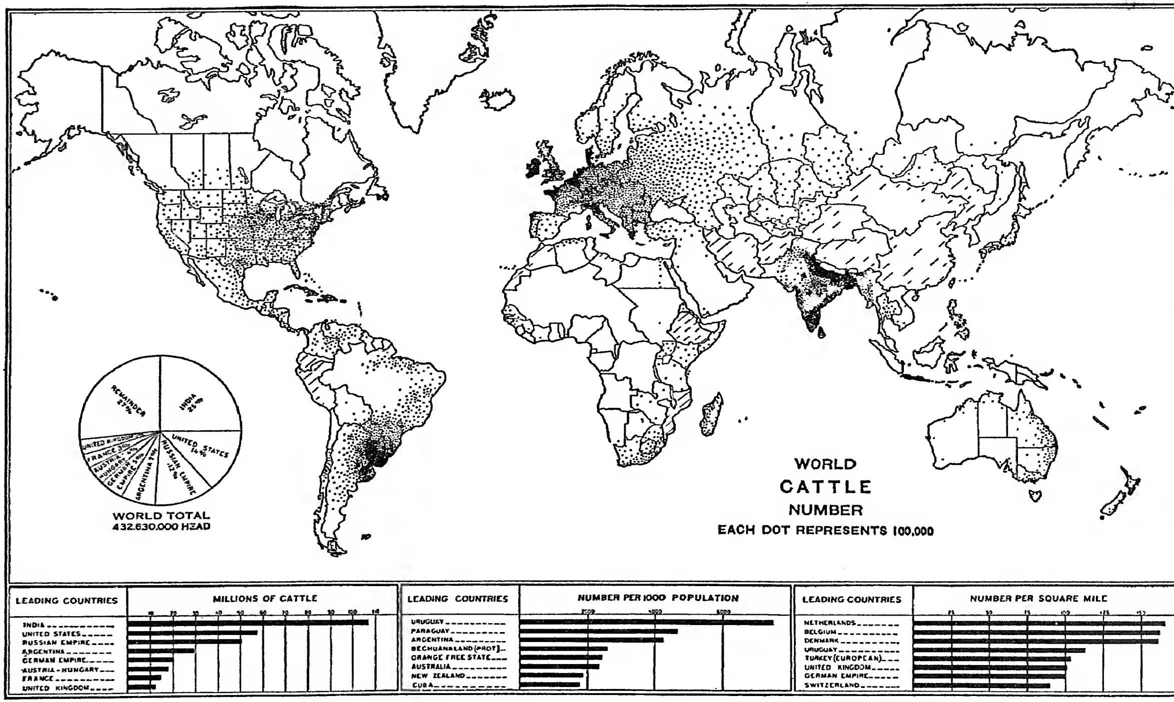

FIG. 43. A product map

and-white production maps published by the various departments of the United States Government very helpful (see Fig. 43).

Special history maps. All progressive history teachers must make large use of political and physical maps to show how geographic environment has influenced the growth and development of social groups. Many other maps, however, specifically designed for history teaching, are necessary to help the student visualize and localize the places where great activities of history have taken place. Almost every phase of history has a geographical background, and teachers will find available excellent maps illustrating nearly every step in the history of mankind. Maps of the ancient world, territorial possessions of ancient and modern empires, plans of the cities of Athens and Rome, conquest maps showing Cæsar's advance into Gaul, the barbarian invasions, the Crusades, and on down to the campaigns of the World War, — all can be purchased singly or in sets. Maps, which emphasize the economic, industrial, commerical, and sociological phases of history in keeping with modern textbooks and present-day points of view should find a place in every history classroom. Maps of this kind are listed in the Appendix.

Use of maps and globes. Maps and globes, like pictures, should not be used as such, but should be used and interpreted as needed to complete an experience and meet a need which arises during the development of a lesson. After the need or condition has arisen, through reading or through a picture, perhaps, the map symbol becomes full of meaning because it is associated with a reality which the child has already encountered.

Ability to read maps intelligently is acquired gradually through weeks of experience in answering questions and solving problems as they arise in normal teaching situations.

ATWOOD TYPE OF REGIONAL MAP

Appended to the regional map are four supplementary reference maps.
(Courtesy of A. J. Nystrom & Co.)

In the third or fourth grades where children are introduced to the peoples of many lands through stories or pictures, pupils become curious to know where these queer little Japanese children live. Is their homeland like ours? How far away do they live? This is the time to introduce the simplest type of globe. A large relief globe with all bewildering names and political divisions omitted is the most ideal for these immature minds. This is their first geography lesson, and it is most necessary that every effort be made to see that right concepts and relationships are conveyed at this time.

The teacher may introduce this miniature world by weaving in an interesting story of the great earth upon which we live, its shape, comparative size, and so on. She can point out just the spot where the children live and mark it with its name so that all can see. Each child can run his fingers over the mountains, valleys, oceans, islands. Then, as he looks out the window at the towering mountains in the distance, if such there are, the teacher may show how tiny is the representation of those same mountains on the small model of the great world, and help him to realize that those tiny elevations on the globe are only symbols for realities, just as words are symbols for objects and ideas.

Now the class may follow the teacher as she turns the globe and traces the path over land and sea to Japan, the little group of islands where the Japanese cousins live. This is also labeled, and the children learn their first lesson about oceans and islands. The Pacific Ocean becomes a reality with a name after they have had the experience of mentally crossing it to the island home of the Japanese.

Each day following this lesson some child may be called upon to trace this long journey on the globe, and each day some curious child will want to know what this land or

that neighboring body of water is. Thus, as the need arises, continents and oceans may be labeled with tiny strips of paper, and they in turn become realities with names.

In a very short time the large political globe may be needed to answer the many questions that arise. It is unfortunate that there are not simpler political globes for young children. The mass of printing, the lines, and the colors of the average globe are most mystifying to the third-grade and fourth-grade pupil who is gaining his first concepts of the earth as a whole.

After several weeks or even months of such lessons with these globes, it is an easy matter to substitute the simple relief or physical hemisphere map for the third-dimension model. For the children are now ready to understand how the globe can be cut into halves and spread out into two hemispheres; they are now able to comprehend the map as a graphic picture of the globe.[1]

When pupils begin to use maps as a part of the daily geography or history work in the latter part of the fourth grade, they should know how to read maps as easily as they do the printed page. Gradually they may acquire the ability to note directions, estimate distance, and interpret the various symbols used in map-making. Teachers must make sure that children can comprehend and visualize definite units of measurement and comparison.

In a practical arithmetic lesson pupils may first make a diagram of the classroom showing number of rows of seats and so on. Here the actual measurements must be taken and reduced to a scale of a half-inch or so to the foot. The

[1] Since the Mercator map is so distorted toward the poles it seems very unwise to introduce it to children below the fifth grade. By that time children should have acquired permanent correct concepts of the meaning of globes and maps in relation to the real earth on which they live. In studying directions and distances in the upper grades, it is necessary to use Mercator maps, but the globes also should be referred to constantly.

children should learn that, as an accepted convention, the top of the Mercator map is the north and the bottom the south.

As the next step the children must be able to visualize the distance of a mile as another unit of measurement. The safest way to guarantee this knowledge is to take the class for a mile walk. Then they have a definite unit which they may always visualize. For instance, it is a mile from the schoolhouse to the bridge down the country road, or a mile from the city school to the city postoffice, which may be just twenty blocks away. After this experience a little drill in reducing miles to a scale of inches, or a fraction thereof, enables the child to understand readily that one inch on a certain map of Asia means a distance of five hundred miles and this to him means five hundred times the distance from his schoolhouse to the postoffice.

In the same way the child may learn to read the story of physical maps with contour coloring, on which elevations above sea level are shown by various colors. He may also learn to read physical maps showing natural regions, on which each type of region has its own color. In this study of maps the pupil learns that a mile is a mile, whether measuring across a plain or measuring height above sea level, and he acquires his first knowledge of altitude.

By the latter part of the fourth grade or the first part of the fifth grade, where a detailed study of the home state is taken up, a pupil should possess a definite knowledge of the conventions of map-making and of the simpler geographic principles, and through his ability to interpret geographic maps should be able to read on them the story of the geographic conditions which control the environment of peoples in any section of the world. By no means should this knowledge be gained as dry facts for the sake of the facts, but through experiences with purposeful activities.

In studying the various natural regions of California, for example, a pupil of the San Francisco Bay region learns from his text and pictures that there are great desert regions in the southeast section of the state, and he may question, "Why is this a desert?" He first looks at his map and sees that there are no cities there and that the population is very scattered. The teacher may direct attention to a rainfall map in the textbook or a wall map, and right then he begins to read the story of this map. He finds that this section of the state has less than ten inches of rain annually. "What amount of rainfall should a place have in order to raise good crops?" is asked. Here again he needs a unit of measurement and comparison. So the teacher guides him back to his own home region, and he finds that there the average annual rainfall is between twenty and forty inches (twenty-five inches to be exact). Knowing that all vegetation grows abundantly in the home region with that amount of rainfall, this datum becomes a unit by which he measures other regions.

By continuing this procedure, in which the pupil is encouraged to gather his own data and to reason from cause to effect, he soon grasps the simpler geographic laws whereby he can determine whether or not a certain part of the world is barren and desert or rich with luxuriant vegetation.

While studying the industries of the great valleys of California, some pupils may ask, "Why don't they raise cotton in the valleys about the Bay region as well as in the Imperial Valley and that of the San Joaquin?" Consulting their books, they learn that cotton needs a long, hot growing season with plenty of moisture. On the temperature map is revealed the fact that the Imperial Valley has a long hot summer with an average of over 80° F., whereas the coast valleys have a mild temperate climate. The rainfall

A TYPE OF HISTORY MAP

map reveals the fact that the Imperial Valley has less than ten inches of rain. Yet cotton needs much water! And so they drift into their first lesson on irrigation, and learn how man, through the exercise of his intellect, has overcome the handicaps of nature and turned great desert wastes into beautiful agricultural gardens.

After pupils have learned to read the interesting story of maps dealing with their own state, the same knowledge may be applied to any region of the world. They soon realize that the activities of peoples are largely regulated by climatic conditions, and they also appreciate the fact that the quickest and surest way to learn geographic facts regarding peoples is to read maps intelligently.

The population map of Australia tells the trained student that most of Australia's seven millions are living in the southeast corner of a vast territory as large as the United States. Why? A close study of physical, rainfall, temperature, and vegetation maps answers nearly all the questions. He finds great dry deserts in the central part, hot, wet jungles in the north, a narrow fertile coastal plain southeast of the Australian highlands with ideal climatic conditions; and so goes on the interesting story.

Modeling relief maps. The purpose of maps is to convey concrete information regarding geographic regions which are habitats of peoples. First, then, children need to get some definite idea of the location and surface features of the various areas where peoples live. This insures definite knowledge and right mental concepts.

When new regions or continental divisions are introduced, it is best to allow children to model maps. The experience of actually making the thing—pinching up mountains of sand or modeline, leveling off plains, cutting out rivers and lakes, and carefully labeling the same,

while working under the direction of the teacher — fixes facts in the mind as nothing else can do.

The larger the map the truer the conception that can be conveyed. Often small groups of children can make excellent relief maps out of sand in the school yard. Here the size can be great enough to afford many opportunities for showing snow-capped ranges covered with flour, forests made of tiny branches, cultivated and grazing areas, and so forth. The long sand table also offers splendid opportunities for making relief maps on a smaller scale. (See Fig. 118.)

Individual sand maps. The simplest individual sand map may be made in the following manner:

Borrow a bucket of sand from a primary grade. Mix water with the sand until it sticks together compactly. Have a child pass quickly down each aisle and deposit one cup of moistened sand on the wrong side of a drawing board or on a piece of heavy drawing paper which has been previously placed on each pupil's desk. Then with a good physical map or desk relief map as a guide, teacher and pupils may work together, building up a realistic map of North America, the United States, or some particular region.

With the constant help of the teacher, maps may be worked out in ten minutes' time. Blue crayon may indicate the oceans, lakes, and rivers. In such an exercise all the important surface features and natural regions that regulate the activities of peoples are carefully located and compared in a general way. This is the goal of this simple exercise. After the map has served its purpose, the sand may be poured back into the bucket as a pupil passes quickly up and down the aisles. Pupils of all ages find this an enjoyable lesson, for all are interested in working with their hands and in creating things.

Papier-maché maps. If better and more durable relief maps are desired, the following directions may be used:

Tear newspapers into tiny bits and place in a large jar or bucket. Cover them with water and allow to stand for three or four days. Drain off the surplus water and work over the mixture thoroughly till it is like a thick dough. It is then ready to use for map-making. As with sand or modeline, the map can be worked out on a heavy cardboard or on a piece of a wooden box which may be planed in the manual-training shops.

Water color or blue crayon can be used to represent water, and the whole may be varnished or shellacked for safe-keeping.

As this is to be a more finished map, it is better to have the pupils work with a ready-made outline map which has been traced or purchased. It is not advisable to use free-hand outlines, for the pupil needs a perfect outline to guide him.

Salt-and-flour relief maps. Some teachers favor a mixture of salt, flour, and water for the modeling of maps. First thoroughly mix two parts of common salt with one part of flour. Add just enough water to hold the ingredients together like wet sand. Too much water makes a mixture like bread dough, which is not fit for modeling maps. This mixture may be applied on an outline map with a spatula or pliable case knife, and the elevations shaped with the fingers. The completed model may be finished as directed for the papier-maché map.

Other materials. More expensive materials, such as clay, modeline, or plasticine, may be bought for making the relief maps. They are convenient for small children to handle.

Summary. In discussing the question of maps for public-school use, no attempt has been made to treat the subject exhaustively. An attempt has been made to em-

phasize only the need and use of certain general types of maps which seem necessary classroom tools and which bring vividness to the teaching of the social studies particularly. Books, maps, and pictures must constantly supplement one another to complete the educational experience.

Other types of maps which are very helpful to the classroom teacher are the blackboard outline maps and the desk

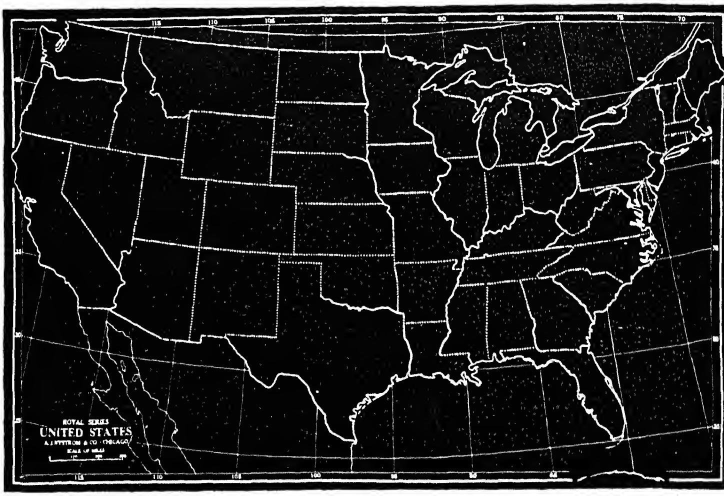

FIG. 44. A blackboard outline map

outline and relief maps. The slated-cloth maps have a black surface, with the continents or states outlined in white. These maps can be written upon and cleaned like an ordinary blackboard, and they are excellent for special demonstration work or to use when testing pupils in review lessons.

The best maps are handmade and may be purchased on spring rollers, which work like the ordinary window shades or with eyelet mounting. The eyelet type of map may be hung on special hooks in any part of the room, and when not in use may be folded and filed away in a cabinet.

THE STEREOGRAPH

Value of the stereograph. Of all the *static* pictures available for school use, the stereograph is unquestionably the most valuable as a means of conveying vivid experiences and accurate mental concepts to the minds of young children. With the exception of the flat picture, it is, of all the visual aids used at the present time, the most available and the most convenient to use in a natural teaching situation.

© Keystone View Co.

FIG. 45. A stereograph consists of two photographs of an object or scene taken simultaneously by a stereoscopic camera

The stereograph and the stereoscope are constructed upon the scientific principle that two eyes see better than one. Both eyes see the same object, but the right eye sees more of the right side of the object and the left eye more of the left side. The brain puts the two images together and sees the whole object. Thus we gain impressions of both solidity and relief.

The ordinary photograph is taken by a camera which has one "eye" or lens; consequently the picture appears flat. The stereograph consists of two photographs of an object or scene taken simultaneously by a "stereoscopic"

camera (with two "eyes" or lenses), so arranged that one lens photographs the object from an angle slightly to the right, and the other eye from an angle to the left. When these two photographs are mounted side by side on a single cardboard and are viewed through a stereoscope, which is an instrument especially designed for viewing a double photograph, binocular vision enables one to have two

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FIG. 46. Using a stereoscope

When the stereograph is seen through this binocular instrument an impression of depth, or third dimension, is received

slightly different images on the respective retinas and at the same time to be conscious of seeing only one image.

The stereoscope itself is an optical instrument with a similar pair of lenses separated by a small wooden partition to keep the right eye from seeing the left view and the left eye from seeing the right view. These lenses are arranged within a cardboard hood which fits over the eyes and tends to shut out the light and other possible distractions. (See Fig. 46.) When the stereograph is seen through this binocular instrument an impression of depth,

or the third dimension, is received. This gives charm and educational value to the picture, as it creates an illusion of reality and seems to transport one actually into the pictured situation. "We see something with a second eye and the mind feels its way into the very depth of the picture, around the object and gets an idea of its solidity," says Oliver Wendell Holmes, who perfected this remarkable device.

The stereograph is therefore a photograph of an actual situation in life, not an artificial creation or stage setting built up for a special occasion. The lens of the camera in this case acts as an unprejudiced, mechanical eye. In studying a great painting we are able to see only what the artist visualized and reproduced on his canvas. The study of the stereograph is almost unlimited. Each time it is viewed some interesting detail far off in the distance is revealed.

Through these interesting devices the great wonders of nature in the remotest parts of the earth are brought truthfully and vividly before us, and great personalities of history, like McKinley, or Roosevelt, or Wilson seem so real that we almost expect them to open their lips and speak. This element of truthfulness brings joy and delight to both old and young. We can imagine what great pleasure and satisfaction these interesting stereographs brought to the quiet hours of the inventor himself[1] as he sat in his easy chair and wrote:

> O infinite volumes of poems that I treasure in this small library of glass and pasteboard! I creep over the vast features of Rameses, on the face of his rock-hewn Nubian temple; I scale the huge mountain-crystal that calls itself the Pyramid of Cheops.

[1] The stereoscope was first devised by Sir Charles Wheatstone, an English physicist and inventor, in 1832. The stereoscope and stereograph which are now commonly used were perfected by Oliver Wendell Holmes, the American essayist and poet.

. . . I stroll through Rhenish vineyards, I sit under Roman arches, I walk the streets of once buried cities, I look into the chasms of Alpine glaciers, and on the rush of wasteful cataracts. I pass, in a moment, from the banks of the Charles to the ford of the Jordan, and leave my outward frame in the arm-chair at my table, while in spirit I am looking down upon Jerusalem from the Mount of Olives.[1]

Use of the stereograph and stereoscope. The stereograph and the motion-picture film are probably the least understood and the most widely misused of all visual materials. Their superior effectiveness is acknowledged, but the technique of their use has not yet been mastered. After serious psychological study and careful experimentation with many classes of children, teachers have come to the conclusion that the stereograph is definitely an individual picture which can be used effectively only by the individual pupil during the preparation of an assigned lesson; it cannot be used with any degree of effectiveness for group work.

Yet directions like the following are only too familiar. "The stereoscope with an appropriate view may be started through a class during a recitation, it being understood that each pupil shall have a half-minute to look at the view. The recitation may meanwhile be continued by the other pupils."

To quote from another author:

If enough stereoscopes are available each child may be supplied with a stereoscope and picture. The pupils will study their pictures for a given time, and when the teacher says "Pass," the pupils will pass their pictures. If there are twenty pupils in the class and one minute is allowed for each picture, every pupil will have the opportunity of seeing all the pictures in twenty minutes.

[1] Oliver Wendell Holmes, *Soundings from the Atlantic*, p. 153 ("The stereoscope and the stereograph"). Ticknor and Fields, 1863.

Let us analyze these directions from a psychological point of view. First, let us repeat two fundamental laws of learning:

1. "The psychological law is that only one object of thought, one 'conceptional system' can be in the focus of attention at any one instant of time."[1]

2. Whether the educational environment with its rich stimuli and impressions produces any fundamental educative effects depends on the intensity of the appeal and the concentration of attention which must be deep enough and prolonged enough to call forth reflective thought and reasoning.

In the first direction, the principle "one thing at a time" is violated. By the time the tenth pupil receives the traveling stereograph, five or ten minutes have elapsed since the pupil or teacher explained the point of interest to be observed in that particular stereograph. Meanwhile the recitation has been proceeding. Many other interesting things have been discussed, and probably other stereographs have been emphasized and started on their way through the class. It is quite impossible for the average pupil to hold all these things in mind and remember what to look for in each particular picture. One of two things is apt to happen. If a pupil is intensively interested in the oral discussion he will pay little or no attention to the passing pictures, his interest being otherwise absorbed. But suppose he does take time to view the stereograph. He must first adjust it, and that takes a little time; then when his eyes enter the closely fitting enclosure of the stereoscope, he enters another world — becomes completely segregated from his group. Like Oliver Wendell Holmes, he leaves his outward frame and travels in spirit to Alaska, China,

[1] Naomi Norsworthy and M. T. Whitley, *The Psychology of Childhood*. The Macmillan Company.

or where not. He becomes deeply absorbed in new thoughts; he looks and looks until an impatient lad pokes him from the rear, reminding him that his allotted time is up. So the cherished, absorbing thing must pass on, only half-studied, and the interest that has been stimulated is pushed aside to make room for the stereograph next to come. So the interested lad slowly gives up his first interest, emerges from the inclosure of the stereoscope, and returns to his class. Meanwhile, however, he has lost the thread of the discussion. Surely here are two results pedagogically prohibited: divided attention and superficial learning.

The second direction violates the principle of sufficient time for real learning. In exposing children to many pictures within a brief period, there is not time enough to permit real thinking and free expression, those two essentials for learning. It is the part of wisdom to teach fewer things and teach them well. It is not, as has been said, so much what we teach as how we teach that really affects the character of growing boys and girls.

Evidently there is much yet to be learned as to the correct use of these strange devices, and it is hoped the following suggestions will be helpful.

How to introduce the stereoscope. Have the group small enough for each pupil to have a stereoscope and a stereograph. Any good stereograph will do, as the purpose here is not to teach a lesson from the picture but how to use the stereoscope. It saves time and energy if a whole group may work together in such a preliminary lesson, and usually enough stereoscopes may be borrowed for the occasion.

After the stereograph has been adjusted in the stereoscope, ask each individual to turn his back to the source of brightest light so that the full rays of light may fall directly on the face of the picture.

Now direct the pupil to look through the stereoscope at the stereograph and tell him to move the little card carrier back and forth until it is adjusted to fit his vision. Explain that this adjustment must always be made for each different individual, in order to get a vivid stereoscopic effect, as the range of vision of different individuals varies greatly.

This device is a novelty and an entirely new experience to most children. It is therefore necessary to explain the effect of the third dimension, which they should see and feel. It often takes even adults some little time to get this stereoscopic effect. Therefore ask the children to observe slowly and carefully, and then question various ones regarding their reactions. In this way teachers may make sure that each child has passed through the desired experiences. Even after such a lesson teachers will find it necessary constantly to remind children of the need of proper light on the picture.

In teacher-training classes, it has been possible through the use of duplicate photographs, one without stereoscopic effect and one with stereoscopic effect, mounted exactly alike and used in the stereoscope, to show the superior value of the stereograph. This experiment has deepened the impression. Unless one really feels that he could walk right into the foreground or reach out and touch the thing observed, he has not caught the stereoscopic effect, and has missed the true value of the picture. The stereoscope serves the individual classroom pupil much as the microscope does the scientist in the laboratory, or as the telescope serves the astronomer: it brings near the far and makes real the unknown.

Guiding pupils to look for the important thing in a picture. It must be remembered that no picture, regardless of its superior qualifications, can be used successfully as a

substitute for books and other valuable educative experiences. Therefore the stereograph is best used only as an indispensable aid to a thorough mastery of definite problems in hand, not as the basic text itself. Moreover it is, as has been brought out, an "individual" aid; the teacher's part is to *guide* the pupil so that as all by himself he studies the stereograph he will absorb the wealth of information it affords, not failing to study also the explanatory notes on the back. Many valuable educational opportunities are often lost just for the lack of proper guidance and interpretation at the proper time. For example:

A traveler in Switzerland might pass through the beautiful garden in the heart of Lucerne and gaze upon the huge sculptured Lion of Lucerne, resting on its rocky ledge high on a perpendicular cliff which seems to have been split and shaped by the great glaciers in ages past. The beautiful setting of trees, flowers, and deep-blue sparkling water at the base of the cliff and even the great lion himself would command his admiration for some time; but, not knowing the significance of it all, he would pass on, and the whole scene would fade from his memory as other things occupied his attention. But if, while he was gazing at this magnificent scene, someone had informed him that this great lion is the most famous monument of all Switzerland, that it was sculptured by Thorvaldsen to commemorate the seven hundred and eighty-six brave Swiss guards who fell defending King Louis XIV and the palace of the Tuileries against the fury of the mob during the French Revolution of 1792, then, recalling that awful tragedy in French history, he would have looked again with new interest. The wonderful carving of the dying lion with his huge head resting sorrowfully on one paw while the other droops wearily over the edge of the cliff would have

had much greater significance for the traveler, and with "new eyes" he would have interpreted the whole tragic story from this expressive figure. The combined sensations of seeing and feeling would have made an impression never to be forgotten. (See Fig. 47.)

So in studying any picture it is often necessary to guide children rather definitely toward some particular lessons, lest the main point of interest and the true value of the picture be lost entirely. It is often a good plan to write on the board a few leading questions to be solved when studying the pictures during the preparation of a lesson. Questions and suggestions as to what to look for from an informational and artistic standpoint will insure both economy of time and efficiency in learning. For instance, the stereograph of the Lion of Lucerne may be used during an art, geography, or history lesson and the following suggestions might guide the study:

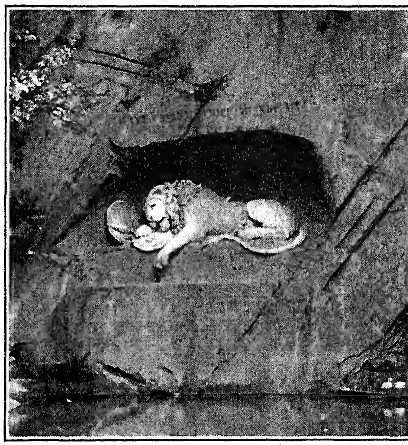

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FIG. 47. The Lion of Lucerne.

Why was the Lion of Lucerne carved?

Who sculptured this monument?

Study carefully the expression of the face.

Do you think the lion is sleeping? Why not?

Does the lion seem realistic to you? Compare it with the picture on the table of a real African lion.

The following specific illustrations of ways in which

teachers have used stereographs successfully may be found of practical value.

1. *In an upper grade.* An upper grade was studying the products and activities of the tropics. The problem for a certain day was, "Of what use is the coconut to man?" During the assignment period pupils and teacher worked out the following topical outline which acted as their guide for the study period. This was written on the board with suitable references to books and stereographs:

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FIG. 48. A coconut-palm tree in Jamaica

Where do coconuts grow?
How do they grow?
Their use to us.
Their use to natives.
How are they gathered and shipped?
The copra industry.

Four stereographs were arranged in stereoscopes and placed in their usual place on the library table, where the students were accustomed to go during the study period to study visual materials closely. These stereographs conveyed realistic accurate impressions of what tall coconut palm trees, laden with nuts, look like; one showed a close-up view of the huge nuts and blossoms growing on one tree at the same time; in another a picturesque native hut stood out in bold

relief, so that pupils could see the thatched roof of palm leaves and the coconut fiber mats that inclosed the sides (see Fig. 91); another showed a native Filipino boy climbing a tree to gather nuts and an immense pile of coconuts at the base of the trees (see Figs. 48 and 49).

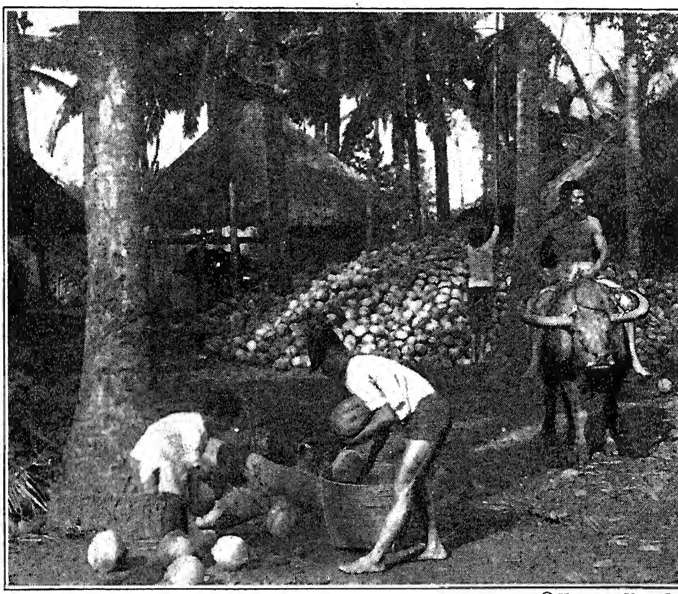

FIG. 49. Gathering coconuts for foreign markets

The story the stereograph told

When the recitation period arrived, every pupil had studied each stereograph very carefully, had examined the exhibits, which showed among other things a half-section of a large coconut and a fiber mat (see Fig. 50), and had also read at least one reference other than the textbook pertaining to his specific topic. As the recitation proceeded, the various pupils used beautifully colored

slides of the same stereographic pictures[1] to explain concretely just what they were talking about; each pupil could follow understandingly because he could recall vividly the more realistic impression gained through the stereograph with its third dimension.

2. *In a primary lesson.* Rarely, with young children, should more than one or two stereographs be used in a lesson. Emphasize only one main point of interest each day. Use the correct impressions gained from a stereograph as a basis for original stories, and for language and drawing work.

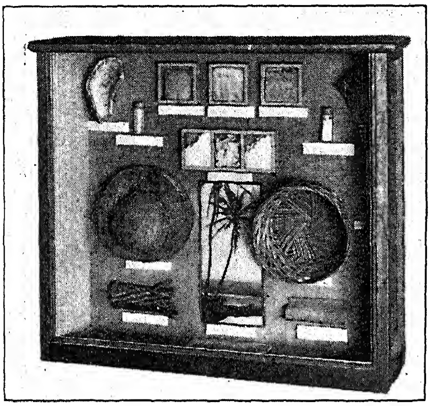

FIG. 50. The exhibit case

This case shows the products of the coconut, which was used in the above lesson. (Courtesy of the Public Museum, Oakland, California)

During the reading about the little Dutch Twins, Kit and Kat, a primary class came to the surprise story which tells about Kit's falling from the boat into the canal. To these first-grade children a canal was an entirely new idea, and the picture in the primer was entirely inadequate. Foreseeing the need of a more vivid realization of this new idea, the teacher had her stereograph ready to present at the psychological moment. Sitting with the group, she said, "I have a lovely picture of this very canal and I should like to have each one look at it very closely, then

[1] Teachers find the stereopticon slide far more effective if a few stereographs pertaining to the same subject can be closely studied previous to the slide recitation. This experience provides a background and rather makes up for the lack of depth in a slide.

close your eyes gently and think hard about the interesting things you saw, until all of you have had your turn. Then you may tell me stories about what you saw."

Keeping the eyes closed for a few moments was, of course, to prevent the wandering of attention away from the central interest, and to enable the children to concentrate more easily and think out what the pictures said. When only a few are working together, the picture can easily be referred to many times, and thus erroneous impressions can be corrected.

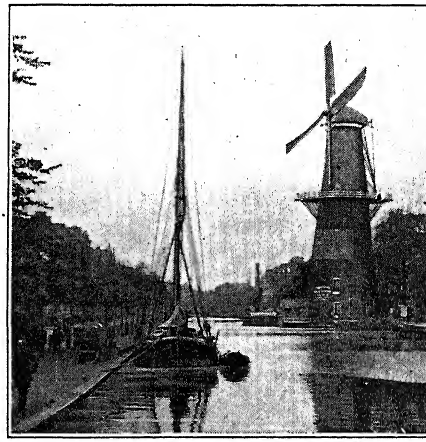

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FIG. 51. The stereograph picture used to explain the meaning of canals and windmills in a first-grade reading lesson

Kit, the little Dutch boy, fell from a boat into the canal

3. *In the opportunity class.* Visual instruction is practically indispensable to effective teaching of retarded or defective children; the stereograph has proved invaluable here. One teacher of a special class of this type of children placed a few stereographs on the library table each day in the hope of stimulating some new interest that might result in purposeful activity. The results were amazing in revealing educational possibilities.

For instance, a few stereographs of wild animals of Africa led a retarded boy into reading *Wild Animals I Have Known* by Ernest Thompson Seton. Later he became interested in making a large illustrated book, in which he

either drew or mounted pictures of wild animals from different parts of the world. In arranging his pictures he realized that he must label them in some way; so he learned to print very well, with the result that his book was one that any pupil might be proud to own.

A display of a partly woven Indian rug and two stereographs showing how these rugs are woven by primitive peoples aroused so much interest in weaving among a group of special-class children that weaving of rugs, mats, and baskets became their major project for a whole semester.

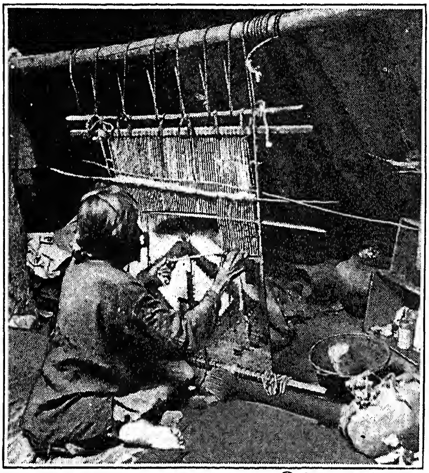

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FIG. 52. Navajo woman weaving a blanket

This picture helped to stimulate interest in the activities of primitive peoples

Limitations of stereographs. The stereograph, like every other visual aid, has its limitations. Its service is definite; namely, to bring to individuals separately — *not* in groups — vivid mental impressions of persons, places, and things.

Like flat pictures and slides, the stereograph is a photograph of a momentary situation and lacks all power to show changes in processes and activities. We may see a vivid picture of a moth ready to emerge from his cocoon incasement and after he has accomplished that arduous task, but we do not see the marvelous struggle whereby he has freed himself. That must be left to the imagina-

tion, and so we are deprived of a certain emotional feeling and realization which accompanies living activity and which adds so much to the effectiveness of the learning process.

Collections of stereographs. Stereographs are more available than many teachers realize.

County library. In some states many county libraries carry hundreds of stereographs well classified and organized in small sets which may be borrowed by rural schools, just as supplementary books and music records are borrowed for long periods of time. In the state of California, for instance, nearly all the county libraries carry many sets of stereographs that definitely enrich the state course of study in geography, history, and nature study. Some librarians have stated that these collections could be greatly enlarged if there was more of a demand for such materials. It is evident that many teachers either do not appreciate the value of or do not know how to use stereographs effectively in their teaching. The rural supervisor has here a splendid opportunity to render a larger service.

School collections. The ideal way is for each school to have a general collection of its own to meet immediate needs day by day, just as dictionaries and reference books meet daily needs of boys and girls. But such a collection must be kept up to date and tie up definitely with courses of study and textbooks that are being used in each community; otherwise, there may be some dead material on hand and a great lack of other material which is greatly needed. Some of the needs and interests of primary children of Vermont or Kansas, for example, are vastly different from those of California or Florida. Children everywhere have many interests in common, but at the same time, the teaching of the geography, history, plant and animal life peculiar to each locality should occupy

a large place in the curriculum of the elementary school. It is often difficult to get good stereographs to meet this local demand. General school collections, however, are worthless to children unless the collections are well catalogued, so that pupils, by turning to an index, may locate pictures as readily as they do words in a dictionary.

Since stereographs are not expensive,[1] it is quite possible for the individual teacher to possess a few for her own grade work should she happen to be located where they are not furnished from a general library center. Every teacher ought, by all means, to equip herself with some type of pictures or objects to help young children understand and visualize entirely new ideas as they appear in the textbooks and come up for discussion. It matters not whether she is teaching by the individual method or group method; concreteness and vividness are necessary for learning.

Where stereographs are used according to the best modern procedure, teachers have found that two or three stereoscopes are ample to use at one time. In small group work in the primary grades, only one stereoscope is necessary for each group, since teachers probably will not use more than one stereograph at any given period. Where individual schools buy sets of stereographs, it is convenient to own at least twelve stereoscopes. This number will provide two or three each for several classes during the same periods.

It is well to bear in mind that when there are collections of stereographs in the classroom it is expedient for the teacher to manage them carefully and not allow children to wander through them aimlessly. There is a definite psychological effect produced when something that is novel is introduced in each new lesson. Therefore it seems

[1] See prices in Appendix.

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FIG. 53. A group of children using two stereographs during the preparation of a lesson

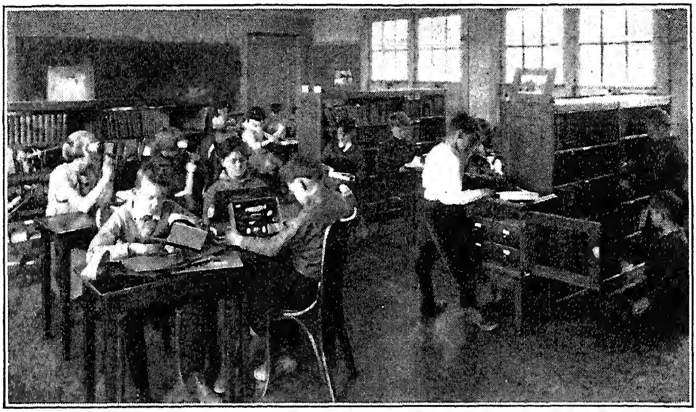

FIG. 54. A study period in an elementary-school library

Fifth-grade children are here studying stereographs, exhibits, and books, in preparing a lesson on the silk industry

wise to allow children to study at will only those stereographs which have *already been used*. It is best to hold in reserve those which are to be used for future lessons.

Collections at city distributing centers. Even though individual schools may own their own small collections of stereographs, there is still need for well-classified sets in a central distributing bureau. Too great an expenditure of money is required to equip every school in a system with all the visual materials needed, especially for upper-grade work where students are working on large units of subject matter and can plan needs definitely several days ahead. A central department can own a great variety of sets for special problem and project work, like irrigation, history of transportation, sea and shore life, birds, flowers, trees, and animals of a state. In a modern school system not many grades are working on the same type of problem at one time; therefore sets may often remain in a classroom until the project is completed. In this way material may be serving some school all the time, whereas, if owned by a single school, it might be used only once during a semester.

Summary. It has been emphasized again in this chapter that each visual aid has its peculiar use in the teaching process, and that the stereograph is most effective when used during the study period while pupils are solving problems in the preparation of assigned work. The stereograph has the power to convey more vivid mental images of static objects and scenes than any other pictorial representation; but, as has been noted, the educative results depend on the proper application of the psychological laws of learning. Teachers must therefore be trained in the economical use of this valuable teaching aid, and children must be guided to appreciate its value and helpfulness to them in carrying on their daily activities.

Stereographs are comparatively inexpensive and are probably the most durable of all the various visual materials now in use in the schoolroom.

THE STEREOPTICON, OR LANTERN SLIDE

Advantages of the lantern slide. Illuminated pictures projected on the wall by a marvelous device, the "magic lantern," have been known since the seventeenth century.

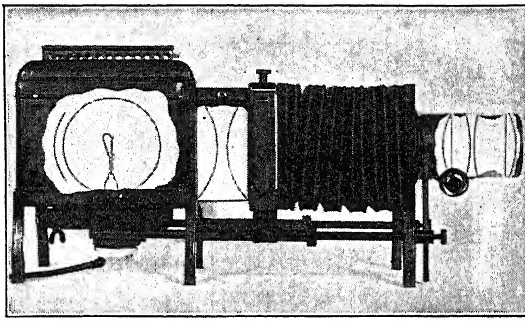

FIG. 55. Cross section of a stereopticon lantern
Courtesy of the *Educational Screen*

The modern stereopticon glass slide consists of a piece of glass upon which is a plain or colored photograph. This photograph is like the ordinary photograph except that the gelatin film is supported on glass instead of on paper. By means of the stereopticon lantern the slide picture may be greatly enlarged when projected on a white screen. The principle of all projection apparatus is much the same. The brilliant light stands in front of a concave mirror which acts as a reflector. The light passes through a set of condensing lenses, which gather up the rays and distribute them equally over the transparent picture slide. Then the brilliantly lighted image is caught by the double-

objective lens and focused on the screen, where it becomes a visible picture. (See Fig. 56).[1]

For many years the lantern slide has been a popular means of entertainment and has also been widely used as an interesting and effective means of illustrating scientific lectures. In the past its mechanism made it rather inconvenient and somewhat dangerous for use as a regular classroom teaching aid. But the portable projection lantern recently placed upon the market has made the use of the slide comparatively simple and easy. (See Fig. 57.)

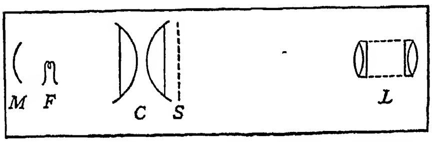

FIG. 56. Optical parts of a modern projector

M, concave mirror used as a reflector; *F*, an electric-light filament; *C*, condensing lenses, used to concentrate the light upon the slide, *S*; *L*, objective lens, which focuses the light rays from *S* to form the screen picture. (Courtesy of the *Educational Screen*)

Where distributing centers for visual aids are maintained by cities, without exception the lantern slide is reported to be the most widely used visual aid in all grades and seems to be the most satisfying visual aid thus far employed in group work. A good slide presents a large, clear picture, in which details may be studied without eyestrain. Moreover, the image it presents remains quiet, so that study and discussion may continue as long as interest lasts. The slide thus becomes an excellent teaching aid, since it makes possible that prolonged duration of attention upon which so largely depend the correctness and the permanence of the impression received. Again, there is available an almost unlimited supply of excellent slides pertaining to a great variety of subjects, thus making it easy for schools to buy good collections of slides. It is

[1] Reproduced from the article "Optics of the Projector," in the *Educational Screen*, October, 1926.

also a simple matter to have any good kodak negative or print reproduced in the form of a slide, the cost ranging from thirty cents to seventy-five cents apiece, according to whether the slide is made from a negative or from a print. Ease of operation is another advantage. The manipulation of the small classroom lantern is so simple that it may be carried from room to room, attached to any electric-light socket, and even operated by any of the children themselves. Nor is a totally darkened room necessary. Even if a daylight screen is not at hand, by means of the new 500-watt slide lantern a satisfactory picture may be projected on the wall, blackboard, or on any type of screen in a semidarkened room.

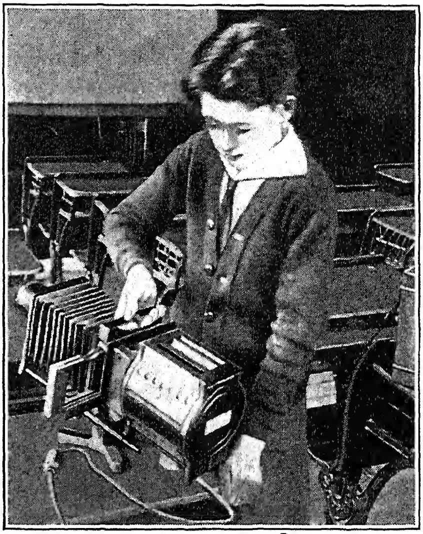

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FIG. 57. Any boy or girl can operate the modern classroom lantern

Use of slides and lanterns. In order to secure the largest service possible, every school should own a portable lantern. If the building is large, it is advisable to have at least one of the smaller type on each floor. Pupils may then use it in the rooms as need arises during the study or recitation period. Incidentally the responsibility thus assumed by pupils for judicious use and careful handling provides excellent training in qualities of citizenship. It is true that slides are somewhat expensive and easily

broken; yet, in order that they may be used to the best advantage, they must ordinarily be handled by the children themselves and not by the teacher. Before attempting to use slides in a regular teaching situation, therefore, a special lesson should be given on the handling of slides and the operating of a lantern.

Suggestions for beginners. Place one slide on a clean white page of a writing tablet. If the page is left in the tablet it may afford a safer resting place for the slide.

Explain to the children that the slide is made up of two thin pieces of glass, a cover glass and a glass containing the positive print of the picture, and that these are bound together by means of gummed tape. It is well for the teacher to have an old slide which she may take apart in order to illustrate concretely why the cover glass is used to protect the picture. It is also advisable to state the cost of a slide and to explain why, if a slide is broken, the class should replace it. Children are usually much surprised to learn that a little colored slide may have cost a dollar or more. Knowing the real value, they are far more careful in handling the slide.

Now explain to the pupils that slides must be kept clean, as thumb marks and dirt deface the picture on the screen; therefore slides must be handled only by the margin. The thumb label is placed in the lower left-hand corner, not only to bear the serial number, but specifically to designate where to hold the slide in order that it may be placed correctly for projection in the slide-carrier. Each child should be allowed to pick up the slide carefully with right-hand thumb over the thumb label and go through the motion of placing it in the slide-carrier which the teacher holds.

It is possible for any normal child of school age to operate the portable lantern after the connection and

adjustments have been made by the teacher, but most teachers of the lower grades prefer to train two or three careful, trustworthy pupils upon whom they can depend to lower the shades and operate the lantern. Even then the teacher must watch closely to see that the lantern is handled with great care, lest the lamp be jarred out of adjustment. It is unwise ever to allow children to tinker with the mechanism of any lantern. The lantern should be examined and adjusted regularly by an expert.

More slides are broken by operators accidentally shoving them off the projection table than in any other way. To guard against this, every school should have felt-lined trays with a rim at least two inches high and containing two compartments, one for the used and one for the unused slides. These can be made in any manual-training department. If the tray is kept on the shelf below the lantern and the operator stands directly back of the lantern, there is little danger that slides will be broken through careless handling.

After slides have been used, the teacher or some reliable pupil should always examine each slide in order to detect any breakage, and then place the slide in its container according to its serial number. This is a great help to any department that lends slides, as every slide must be checked again after it is returned to the central bureau. If children are taught to handle slides carefully, it is astonishing how few slides are broken. In one rather small school system, where 29,800 slides were used during one term, fewer than a dozen slides were broken or lost.

Procedure in developing lessons. Just as the stereograph is typically an individual picture, so the stereopticon slide is definitely adapted to group work. Slides, however, will be found advantageous in any of the following uses.

1. In the assignment of a lesson the teacher may use the slides to stimulate interest in opening up a new unit of subject matter.

In an upper-grade history class the teacher projected an excellent slide of the Cliff Palace of Mesa Verde National Park, in Colorado. She spent a few minutes relating the

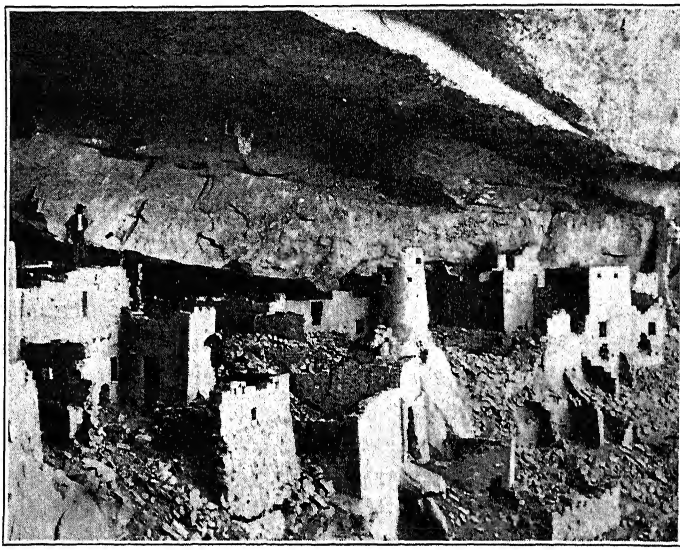


FIG. 58. The Cliff Palace of Mesa Verde National Park, Colorado

fascinating story of the mysterious cliff-dwellers, who built these great "apartment houses" containing hundreds of rooms, far up in the rocky cliffs where overhanging rocks often formed a natural roof. After emphasizing various details to be observed in this slide, she went on to say that the ancient peoples who built these marvelous palaces evidently had reached a comparatively high stage of civilization long before the white man discovered America, that they cultivated the soil, made pottery, cloth, baskets,

and stone implements. To emphasize her point, she here produced another slide showing pieces of pottery, farm implements, dried corn, and other things that had been found in the ruins. Finally, she showed a slide of a relief map of the United States, upon which she pointed out just where the Mesa Verde National Park is located. By this time interest was keen and the students were bubbling over with a desire to ask questions. Who were these people? Where did they come from? Why did they build homes in cañons in such a desert region? What became of them? All these questions were written on the blackboard, and the way was paved for an interesting research period for the next day. As a result of this procedure every pupil in the class worked happily for days seeking further knowledge from books and other sources of information. This lesson also aroused a desire to study about other early inhabitants of North America, such as the Pueblo Indian, the Mayas, the Aztecs, and the Toltecs.

2. For conveying information during the recitation period the slide is invaluable in a socialized recitation. The picture can be viewed and appreciated by the whole group at one time, and interest and attention are easily held while different pupils assume responsibility in leading a discussion of the subject which the slide illustrates. In this case the picture not only conveys concrete information to each individual at the same instant, but it acts as a guide to help timid children to recall the interesting facts that they wish to emphasize in their special report.

This function of the slide recitation has done more to develop poise in timid boys and girls and to teach good oral expression than any other method yet used. Any child is proud and happy when he can get up before his classmates and present an interesting topic that he knows is new to the rest of the group. To be able actually to

give correct information in response to questions from both classmates and the teacher herself fills any lad with greater self-confidence and ambition to do more and do it better. Even college students frequently confess that, through presentation of special topics with the aid of slides, they developed a greater ability to express themselves before a group than they had previously possessed. The fact that they can pause and, with pointer in hand, point out some definite feature to be observed in the slide relieves the nervous strain and gives them a chance to collect their thoughts or refer to a note. Allowing members of the group to rise and ask questions when more detailed information is needed also deepens the interest and helps the speaker.

There is little gained if students are allowed to read papers. A brief oral discussion coming right from the heart of the pupil is worth ten times more both to the group and to the pupil reporting.

It is to be remembered that in this type of lesson pupils are gaining new information and impressions. It is therefore necessary that the slides be well chosen as to subject matter and that, as previously stated, only a few be used at one time. Teachers frequently ask, "How many slides ought to be used for one lesson?" This varies with the age of the pupil and the type of the subject. The point is not so much the number of separate slides that are used as the number of new ideas expressed in each slide. There should be only one central focus of interest developed fully and concretely for each lesson. Several slides may be needed to illustrate even a minor point. For example, in the lesson on the "Coconut and its Use to Man," described in the chapter dealing with the stereograph, a pupil might use four or five good slides, if available, to explain the growth and development of the palm

tree alone. One shows short, stocky palms growing on the shores of Florida (Fig. 59); another shows a distant view of great tall palms of the Pacific islands, which tower above all other vegetation and appear like groves of great inverted feather dusters waving in the tropical breeze (Fig. 48). A third slide shows a close-up view of the bunches of nuts and blossoms at the top of the tree; a fourth shows a native climbing the tree to get the fruit; a fifth shows natives at the foot of the tree drinking the milk from the small opening in the end of the coconut. All these views relate to the central idea or main problem in the lesson of that day. Thus in such a lesson with older children ten or twelve significant slides might be used very effectively, if taken slowly and allowed to remain on the screen long enough for close observation and free discussion. The stereograph also, used before and after the slide, helps to fix facts permanently in the mind.

© Keystone View Co.

FIG. 59. Coconut-palm trees of southern Florida

It is a most serious mistake to use whole sets of twenty-five to fifty slides dealing with many phases of a topic during one lesson. It is practically a waste of time, as the

pictures come and go so rapidly that there is no time for discussion or reflective thought.

Again we need to emphasize that the lesson or report is not based on the slide. Children should be trained not to talk *about* the slide but to utilize the picture to emphasize or make clear a point under discussion. Many a slide lesson amounts to little less than a description of pictures projected, and we hear a continuous repetition of "This slide shows ______. And this is a picture of ______." There is no growth or development on the part of the child in such a procedure.

Other uses of the slide will be discussed in the chapters dealing with the separate subjects of the curriculum.

3. In the review lesson, lantern slides may be used effectively to recall and fix permanently in the minds of children important facts or situations which have been studied in a series of lessons in geography, history, or nature study.

For example, after the class has spent time studying China from books, exhibits, and pictures of various kinds, the whole experience may be relived by using a small set of slides to reëmphasize the special points of interest. This review should be managed by the children and teacher working coöperatively.

Or the review lesson may take the form of a test of knowledge. When a class has completed the study of a certain number of birds that visit the immediate vicinity, in order to measure the results of definite knowledge gained, the teacher may throw the picture of each bird on the screen and call upon John or Jane to name the bird and give interesting facts about it. She may again project each picture very rapidly and call upon Mary simply to name the birds correctly.

Limitations of the slide. Unlike the stereograph the slide cannot show depth, and therefore cannot convey so vivid

an impression. This lack is greatly overcome, however, if exhibits or stereographs are used before presenting the slide. Like the stereograph, the slide also is a static picture, and therefore is somewhat limited in the range of experiences that it can present. Its use is also unfortunately limited, ordinarily, to the village or city school, because of the fact that the lantern operates by means of electricity. This has also been a serious handicap in cities where classrooms have no electric outlet. It is possible, but certainly far from satisfactory, for an individual class to move to a huge auditorium for a lantern-slide lesson; besides being inconvenient and wasting time, the removal involves the loss of the intimate classroom atmosphere. This handicap is rapidly being overcome in all progressive cities. Not only are all new classrooms being equipped with proper projection facilities, but many old classrooms are being wired in response to the desire of teachers to use the projector and screen in their regular classroom procedure. The improved daylight equipment now available has overcome many rather serious handicaps, and has completely solved the problems of ventilation and darkness.

Expense of equipment is still a serious handicap in most schools. The cost of the smallest portable lanterns ranges from about $45 to $65, and slides range from 35 cents up for plain slides, and from 75 cents to $2 for colored slides. But it is only a few years ago that pianos and phonographs were considered expensive pieces of equipment; yet today even the most conservative appreciate the great value of music in the development of character and approve their purchase as a legitimate expenditure of the school funds.

Collections and supply. Since lantern slides are expensive and since they are ordinarily used in small sets,

especially in the upper grades, the majority of school systems assemble in a distributing center choice sets of the best colored slides obtainable. Here they may be properly cared for and lent out as needed. This plan permits of the selection of a wider range of material from a greater variety of sources with a consequent greater usefulness. Some slides may be in use in some class nearly every week in the school year. Weeks of careful study and search are necessary in order to assemble desirable sets. Subject matter must be studied carefully; the mental level of the children to whom the slides will be shown must be borne in mind; and the quality of every slide must be given discriminating attention. The final responsibility for the selection and purchase of slides should rest upon one person, but the coöperation of the teachers is essential. No one knows so well the intimate needs of the classroom as does the teacher, and her judgment should be carefully heeded; this is particularly true of the teacher of the primary grades, where locality is an important factor in the subject matter taught. Usually, however, she has little time to search for the right type of material, nor is she equipped with knowledge as to where to get slides or what constitutes a good slide. This must be left to a specialist in this field.

Where schools are isolated and have not access to a lending bureau, the school should own a carefully selected set of stereographs and slides which bear directly on the subject matter of the course of study. As was stated in connection with stereographs, there is a great advantage in having such material well catalogued and indexed in a suitable cabinet where it is easily accessible to all pupils. This is particularly advantageous in the primary grades, where often only one stereograph and one slide are used to develop the daily reading or language lesson.

Colored slides. Color greatly enhances the value of most slides. The criticism that color makes the slide so attractive that it is apt to dissipate attention seems illogical. The fundamental reason for using visual material is to bring to the child a concrete vivid impression of something that is beyond the realm of his immediate environment; therefore the pictures should be as realistic as possible. Color in a slide adds life and realism, and greatly compensates for the lack of real depth or movement. The younger the child, the more valuable is the colored picture in order that first impressions may be correct. Older students, with their richer background of experiences, are more able to exercise imagination and visualize the truth from a black-and-white picture than the younger children with their very limited background. Incorrect or inartistic coloring, of course, is a real detriment to any picture, as it conveys erroneous ideas of places and things, and exposes young children for long periods of time to examples of poor taste. In many subjects it is difficult to buy artistically colored slides. The school department that possesses an expert colorist is fortunate indeed.

The making of slides. Some of the most valuable slides used for classroom instruction have been made from kodak negatives taken on field trips and vacation excursions. Many teachers never go on such trips without a camera. Some teachers make their own slides; others have the work done by good local photographers.[1] Often local camera shops, for a very small sum, will make slides for school use from their own negative of attractive local scenes and industries.

[1] An excellent little handbook giving detailed information regarding the making and coloring of lantern slides may be obtained from the Eastman Kodak Company at Rochester, New York.

Effective work is also accomplished where students make their own slides for certain specific lessons. Slides of maps, charts, graphs, or songs may easily be made by hand in the classroom. In the upper grades, it is well to keep a box of cover glass on hand.

Maps or diagrams may be drawn on a clean piece of slide glass with India ink or with special lantern-slide ink, which comes in various colors. Maps may be drawn freehand, or the glass may be laid over a small map in a book and the map traced on the slide. For special use these need not be bound but may be slipped into the slide-carrier as they are. The same piece of glass may be cleaned and used many times. A box of cover glass may be purchased for about thirty-five cents from any photographic supply shop.

Children have also used thin onion-skin paper for tracing the maps, tracing them in pencil, and then outlining them in India ink. The paper is then pasted at the edges on a piece of slide cover glass and projected. This method, however, does not give such definite pictures as are secured by drawing on the glass itself.

It is easier to write on a piece of cover glass if one side is coated with a thin emulsion of some kind. The following emulsion has been successfully used: Mix one-half teaspoonful of good mucilage, glue, or gelatin in one quarter of a cup of hot water, and with a thoroughly clean water-color brush spread the solution over the upper side of the slide glass. The coating must be very thin and brushed on very smoothly, and the slide left flat on a clean white paper until dry. When thoroughly dry, this slide may be written on with pen and ink. Children may illustrate their stories on such slides, and can project them on daylight screens. Even though the adult judgment pronounces such a slide poor, the child is tremendously

benefited by merely creating something all his own and having the satisfaction of seeing his work actually projected on a great screen before his classmates. Such activities should be encouraged.

Songs and announcements for auditorium use may be typed on specially prepared sheet gelatin, which may then be placed between two cover glasses and bound like other slides.

Sources of supply of lantern slides. With the exception of the colored slide, generally speaking, there is a wealth of material to be had, especially in the fields of geography and a few of the sciences. There is, of course, a serious lack of good slides in the field of history, which is quite natural, since photography as an art is a modern development.

As was stated of colored views, valuable slides may be borrowed for school use, free of charge, from chambers of commerce, the United States Forestry Department, railroad companies, — the Great Northern, Santa Fe, and others. Nearly every large tourist bureau and steamship company also circulate slides and films, which are uniformly correct, up to date, and of superior quality. Interesting and excellent slides, portraying the life and industries of Australia and New Zealand, may be borrowed from the Hind, Rolf Steamship Company of San Francisco, California. The Cunard Steamship Company also circulates slides showing scenes of various parts of the world. (For further information see the classified list in the Appendix.)

PROJECTION APPARATUS

Projection lanterns. There are many excellent makes and models of projection lanterns both for stereopticon slides and for opaque materials. Some are designed for the projection of lantern slides only; others for post cards

and illustrations from books or original drawings; and others are designed to meet the popular demand for a simple combination projector which will project lantern slides, opaque material, or, by using a small attachment, microscopic slides. Such apparatus has become indispensable to efficient classroom teaching. The operation of the newer projection lanterns requires no special knowledge or experience, but is as simple and safe to operate as the reading lamp or the electric toaster in the home. Prices range from $45 to about $200, according to size and special attachments.

The principal illuminant supplied for these more modern projectors is the gas-filled tungsten-filament lamp such as the Mazda, ranging in power from 400 to 600 watts. This lamp may ordinarily be attached to any lamp socket of 110 volts. Where regular wiring is not available, special 6-volt lamps for use in a storage battery and a 30-volt lamp for individual lighting plants may be obtained from various companies.

The quality and size of the picture on the screen depend, primarily, on the focal length of the projecting lens and the projection distance. A small 400-watt lantern will project a picture thirty inches wide on a daylight screen or on an aluminum-coated screen and produce an image measuring ten or twelve feet, according to the distance between the lantern and the screen. For example, a ten-inch lens used at a distance of forty feet from the screen projects an image measuring twelve feet on its longer side.

In selecting a projector it is therefore very necessary that "one should determine the distance at which the lantern is to be placed from the screen and the size of the picture desired. With these two factors given, the focal length of the lens required can readily be determined by reference to one of the tables given below. Any picture out of pro-

portion in size to the distance at which it is being viewed appears unnatural and lacking in perspective and is a strain to the eyes of the observer."

The following tables "give in feet the length of one side (the longer in case of lantern slides) of the screen image to be obtained at the different projection distances and with the different lens foci indicated."

TABLE I. FOR LANTERN SLIDES, 2¾ × 3-INCH MAT OPENING

FOCUS OF LENS	DISTANCE FROM LANTERN TO SCREEN										
	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.	45 ft.	50 ft.	60 ft.	70 ft.	80 ft.
6-inch	7½	10	12½								
8-inch	5½	7½	9½	11½	13	15					
10-inch	4½	6	7½	9	10½	12	13½				
12-inch		5	6¼	7½	8¾	10	11¼	12½	15		
15-inch		4	5	6	7	8	9	10	12	14	16½
18-inch				5	5¾	6½	7½	8¼	10	11½	13

TABLE II.[1] FOR OPAQUE OBJECTS, 6 × 6-INCH OPENING

FOCUS OF LENS	DISTANCE FROM LANTERN TO SCREEN				
	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.
15-inch	5½	7½	9½	11½	
18-inch	4½	6	8	9½	11

Lanterns for slides only. If the supply of lantern slides is adequate, the most efficient projector for classroom use is a small-sized 500-watt type, such as the "model B Balopticon," manufactured by the Bausch and Lomb Optical Company, or the "Delineascope, Model E," 500 watts, manufactured by the Spencer Lens Company. (See Figs. 55, 57, 60, 66, 67.) This type of lantern is simple and compact, and can be easily carried. It weighs from thirteen to fifteen pounds; and, with a short focal lens (four-inch),

[1] This table and the preceding one are reproduced here through the courtesy of the Bausch and Lomb Optical Company, Rochester, N.Y.

it can be used on a tripod with a daylight screen, or with a longer focal lens of ten inches it will project a six-foot picture on an aluminum screen twenty feet away. Even in the latter case the room need not be darkened. By drawing the shades so that the screen is in semidarkness, a very satisfactory picture is projected. Thus ventilation is not prevented, and students have ample light to take notes if necessary. In the primary department this lantern may be placed on any classroom desk and, by means of the tilting device, a picture may be thrown on the blackboard in any part of the room. (See Fig. 81.) In this manner teachers may write on the projected blackboard picture the names of certain images, and thus help young children more definitely to associate the word symbol for the true object for which it stands.

These lanterns are equipped with excellent lenses; so the prices are a little high, ranging from $57 to $65. Recently the Bausch and Lomb Optical Company have placed on the market a small 400-watt lantern which retails for about $45 (see Fig. 67). This lantern is particularly adapted for projection on a translucent screen or in an average classroom where the projecting distance does not exceed twenty-five feet. It is also designed so that the new film-slide attachment may be used at any time in place of the glass slide. These attachments retail for about $38.50.[1] Still cheaper lantern-slide projectors retail for as low as $26.50, but, as they are equipped with only 250-watt lamps, they are less suitable for efficient classroom work.

The most unsatisfactory apparatus for the ordinary glass slide is the stereopticon attachment used on the semi-portable and professional motion-picture projectors. These

[1] This equipment is explained in the following chapter dealing with the film slide.

machines are equipped with 1000-watt Mazda lamps, and, although they project a large, clear picture, the illumination is so powerful that the glass slide would crack if it were retained on the screen long enough for effective teaching. On the other hand, there is very little danger of cracking a slide from excessive heat in the smaller machines equipped with the 400-watt or the 500-watt lamps, provided reasonable judgment is used.

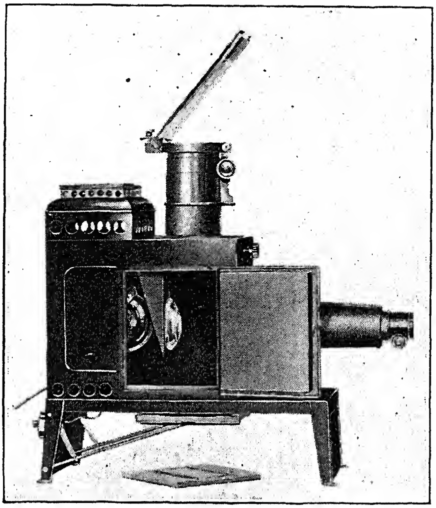


FIG. 60. A combination lantern-slide and opaque lantern

The large size uses a 1000-watt Mazda bulb. (Courtesy of the Bausch and Lomb Optical Company)

Combination slide and opaque projector. Probably the most efficient general projector for schools that do not have continuous access to a lantern-slide library is the combined slide and opaque projector which is designed to show stereopticon and microscopic slides, or post cards, prints, and drawings. The interchange between the projection of opaque material and glass slides is instantaneous, being effected by simply turning a convenient lever on the outside of the lantern. These projection lanterns are of various makes and models, ranging in price from $90 for the small 500-watt classroom size, to $200 and $300 for the large 1000-watt tungsten-lamp type, which can be used in auditoriums (see Fig. 60).

Daylight projection. During the years 1926 to 1928 remarkable progress has been made along the line of daylight projection, although projection of this type, particularly opaque daylight projection, is still in its infancy. It seems quite possible that a thoroughly satisfactory daylight projector for both slides and opaque

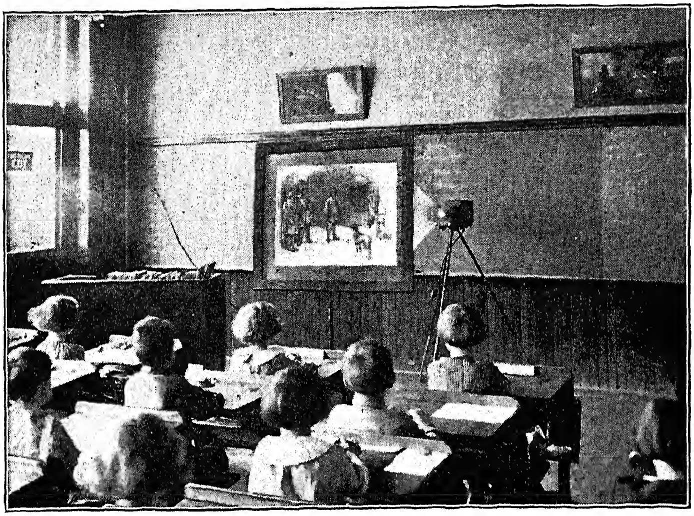


FIG. 61. Daylight projection used in making a history lesson significant
Courtesy of the Spencer Lens Company

objects will soon be perfected. At the present time there are at least two semidaylight projection lanterns for both slides and opaque objects, which are rather rapidly taking the place of the older dark-room types of balopticons. Hundreds of schools are using these machines with translucent screens with a great degree of satisfaction.

In wiring classrooms it is wise to have outlets at both the rear and the front of the room. The baseboard socket is the most convenient for any type of classroom projection;

it is handy to get at; extra cord can be flat on the floor; and there is less danger of tripping over cord and upsetting lanterns. Some prefer to have the cord suspended directly over the projector.

Thus far so-called "daylight" projectors operate from the rear of a translucent screen, which usually stands on a tripod directly in front of the teacher's desk. In order to obtain a satisfactory picture when projecting from the rear of such a screen, it is necessary to shut off or subdue all light from the rear or directly at the sides of the screen. This means that the projection apparatus must stand in semidarkness, especially with opaque projectors.

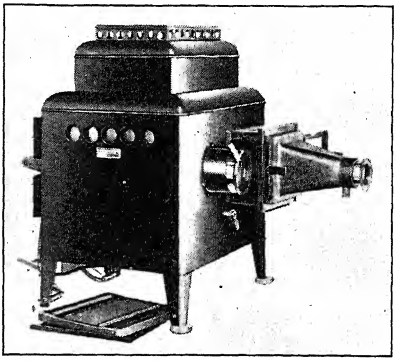


FIG. 62. A combination opaque and glass-slide lantern for semidaylight projection

Courtesy of the Bausch and Lomb Optical Company

Screens. The matter of a screen causes little trouble with the type of lantern now available. There are many types of screens manufactured, ranging from the homemade device to the expensive gold, silver, or aluminum-coated, which give a high illumination. The latter can be purchased for from fifty cents to $1.25 a foot.

The size of the average classroom compels the projected picture to be comparatively small, probably less than six feet by eight feet. With black-and-white slides, the blackboard may be used for certain types of lessons. If the blackboard is chalked and then lightly erased, a clearer picture will be obtained. The most satisfactory

screen, however, is the plain white or light-colored wall. If such a space is not available, the back of a good spring-roller map or heavy white muslin or canvas may be used. These latter materials may be cut the required size and tacked on a spring roller, as a window shade or wall map would be. By applying a heavy coat of flat white paint and fastening a rod of some sort at the bottom to keep the

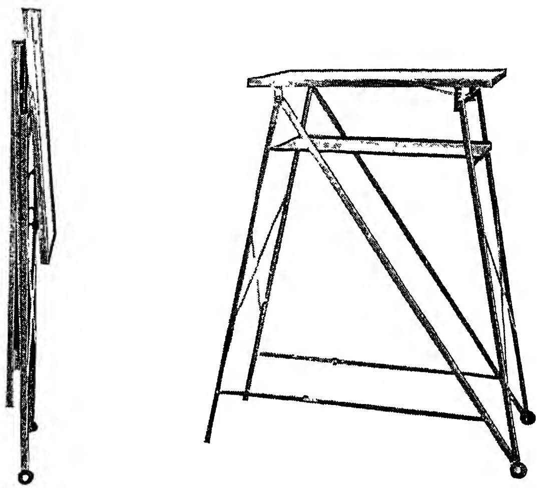


FIG. 63. A folding projection table
Courtesy of the Bausch and Lomb Optical Company

curtain from cracking or wrinkling, a very inexpensive screen can be made by any teacher. If this spring roller is fastened on a blackboard with screw eyes at the top, the screen can be transferred from room to room and quickly hung in proper position.

Although these homemade devices may give very good satisfaction in the average classroom, nevertheless it must be emphasized that the better the screen, the better the picture. A metallic-coated material gives a high il-

lumination and increases the brilliancy of the picture; therefore an aluminum-coated screen will give much better satisfaction in larger rooms where the projecting distance is greater.

Aluminum-coated screens are especially recommended for projecting opaque objects, microscopic specimens, and for all work requiring brilliant illumination. Because of the high reflecting surface of all metallic-coated materials, however, careful consideration should be given to the seating of the spectators when screens of this type are used. The seats should be placed within an angle of sixty degrees from the center of the screen; otherwise the picture may seem somewhat distorted.

FIG. 64. A substantial iron frame with an adjustable top

Courtesy of the Spencer Lens Company

Translucent screens for daylight projection are in the early experimental stage, and are therefore expensive. There are several on the market at the present time that are used extensively and are giving a fair degree of satisfaction, but new and improved types are being put on the market every few months. It seems reasonable to predict that all classroom projection of the near future will probably make use of some type of daylight screen. (See Appendix for sources of supply and costs.)

THE FILM SLIDE, OR STILL FILM

As educators have manifested a steadily increasing interest in visual instruction and have demanded more and better materials, the commercial world has been quick to respond. The stereopticon slide, while it has been one of the most popular and effective of visual aids, has serious handicaps: the glass slides have been comparatively expensive, they are bulky to handle, and they are rather easily broken. The need of improvement has long been recognized, and many attempts have been made to relieve the situation by experimenting with various devices in order to produce a nonbreakable slide. A comparatively recent contribution has been made in the form of a film slide, which consists of still pictures printed on strips of noninflammable motion-picture film. Several such devices have been introduced by various commercial companies, under different names, such as film slides, still films, and picturols. Some of these pictures are printed on standard-width film, and others on noninflammable stock two and one-fourth inches wide. Several of these films are projected on the screen by means of a specially designed projection machine, while others are projected by means of a small film-slide attachment which may be fitted to the ordinary stereopticon lantern. (See Figs. 65 and 66.)

Advantages and disadvantages of film slides. Although the film slide is comparatively new and as yet in the experimental stage, it has made a favorable impression on educators in general.

Since the pictures are printed on strips of motion-picture film, a strip containing from twenty to one hundred separate pictures with suitable captions may be only a few feet long. These little strips come in tiny rolls fitted

into small round cans or wrapped on specially designed spools which also fit into small metal containers. Thirty of these rolls of standard films may be fitted into a neat little carrying case which looks like a well-bound library book. These new slides are therefore durable, safe, and convenient to handle. A half-dozen rolls may be shipped from school to school by parcel post for a few cents.

Not only are these film slides more durable than the glass slide, but they retail at from one half to one tenth the price of the plain standard slide. The cost of a roll of film slides is usually regulated according to the number of pictures on the strip of film. Each picture on the standard one and three-eighths-inch film averages about five cents per picture and twenty-five cents for the wide two and one-fourth-inch film. This price usually includes the captions and printed syllabus. At this price it is quite possible for almost any rural school to possess a small library of pictures that will correlate closely with nearly every subject of the curriculum.

At least four reliable companies are now producing film slides from original negatives, and each concern seems to possess a large stock of negatives particularly related to the subjects of geography and general science. Teachers may also have film slides made from their own negatives at a nominal cost.

Like glass slides, the film slide is primarily for group use in developing or reviewing an assigned lesson during the recitation period. There are several disadvantages in using the film slide because of the fact that the pictures are necessarily arranged in a permanent sequence. In the first place, the teacher is more apt to need only one or two or three pictures at one time in developing a lesson. Although the film slide may be put in the projector at any

picture and turned backward or forward, it is more inconvenient to find the picture needed among a series on a roll than to pick out a single large slide. In the second place, in using a prearranged series of pictures pupils are inclined to project all the pictures of the series at one time, and these ordinarily contain too much information to be grasped during one lesson. In the third place, children are deprived of the excellent training of organizing their own subject matter according to their own original ideas. This is the most serious objection to the film slide. It is possible, however, that some inventive genius will soon find a way of producing individual film slides that will meet this situation.

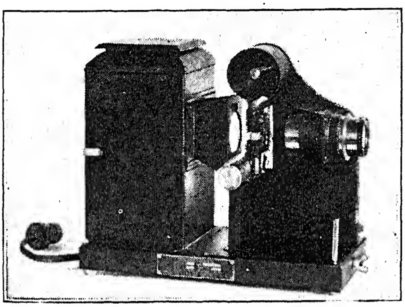


FIG. 65. A still-film projector
Courtesy of the Spencer Lens Company

Although most of these new slides are far from ideal in quality, at the present time, we are indeed grateful that a light, inexpensive, and nonbreakable slide has been produced for classroom use. As a result of patient and careful experimentation, remarkable improvements are steadily being made, and it seems certain that there will soon be developed a film slide equal to the glass slide in clearness and beautiful realistic coloring.

The film-slide projector. The projection of the film slide on the screen, either on a daylight screen or in a semi-darkened room, is probably the most convenient and inexpensive of any screen projection. At the present time there are at least three successful small film-slide pro-

jectors weighing from five pounds to seven and one-fourth pounds and ranging in price from $35 to $60. These miniature projectors may be connected with the ordinary electric-light socket and, although equipped with only a 200-watt Mazda bulb, they throw a remarkably brilliant picture on the screen. The picture ranges in size from a few inches to several feet, according to the distance from the screen. The operation of these projectors is so simple that any child may operate them with safety. (See Fig. 65.)

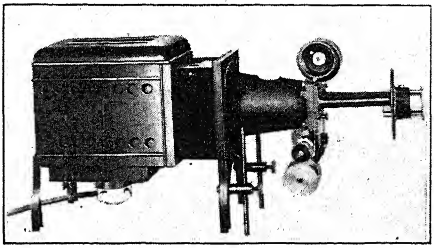


FIG. 66. A stereopticon lantern with a film-slide attachment

Courtesy of the Bausch and Lomb Optical Company

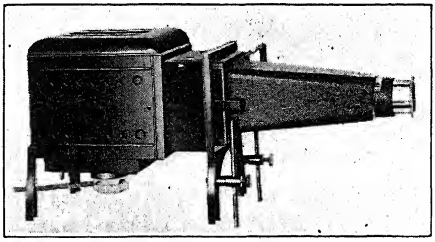


FIG. 67. Lantern ready to project glass slides

Courtesy of the Bausch and Lomb Optical Company

Film-slide attachments. If the school already owns a stereopticon lantern for glass slides, the purchase of a complete projector is not necessary. There are on the market at the present time two complete film-slide attachments which fit on the ordinary Model B Bausch and Lomb Balopticon or the Spencer Delineascope (see Fig. 66). The wide two-and-one-quarter-inch film slide is used with a specially designed slide-carrier (see Fig. 68), which fits into any stereopticon lantern. The film passes horizontally through two pieces of glass,

which are arranged in the slide-carrier just in front of the condensing lens. The film winds on spools attached

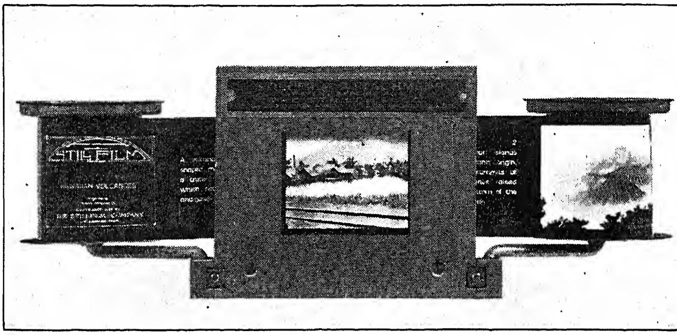


FIG. 68. A slide-carrier for two-and-one-quarter-inch still films

This carrier may be used in the ordinary stereopticon lantern. (Courtesy of the Stillfilm Company)

at each end of the carrier. The films operate backward or forward, as may be desired. Many of the film slides are beautifully colored.

THE MOTION PICTURE

The history and development of the motion picture. The motion picture is one of the greatest achievements of modern times, and is, perhaps, the most powerful influence on society today. One author declares that the motion picture is essentially the evolution of the printing press, not of the theater, and in its educational possibilities will outstrip even that potent agency of civilization. It reaches all types of people, rich and poor, intelligent and illiterate, and, with its ability to present motion, affords the great majority of them their nearest approach to first-hand observation of life beyond their own immediate environment. It surpasses all other pictures — in-

deed, all other educational tools — in its power to convey definite information, even thought itself; yet as an educational factor it is still in its infancy.

It took six long centuries of slow progress, after the printing of the Gutenberg Bible about 1450, to perfect the printed word; the motion picture was first presented to the world less than thirty years ago. Yet its intrinsic power and world-wide appeal have so captivated the public mind that today it is universally utilized by the commercial and industrial world as the most effective means of advertising; it has invaded the church, the school, and the home; and it has created an industry that ranks fifth in the world in wealth and output. In such rapid development, quality and perfection have necessarily been sacrificed somewhat to quantity and haste and to unworthy exploitation.

For several years there has been a general dissatisfaction from the "movie-going public" itself, and people in general have been demanding a higher type of entertainment. Participating in this general unrest, and recognizing that the motion picture is the most effective universal educator the race has ever known, educators and the "intelligent public" have begun to study it carefully and extensively in order to determine how best to use it as a means of conveying knowledge to young children.

Some conservative teachers have been prejudiced against the motion picture as a classroom aid, probably because it came from the entertainment world; other formalists frown on any teaching method that tends to make learning easy and enjoyable. To them the getting of knowledge means hard work unaccompanied by the stimulating factors of interest and joy. Still others, unfortunately, are self-satisfied and unwilling to make the extra effort that the use of any new equipment involves.

It is when boys fall into such unworthy hands that they become discouraged and drop out of school.

To perfect the motion picture for educational purposes will require time, energy, money, sound pedagogical information, and earnest, competent study. Producers and manufacturers need encouragement rather than criticism from the professional educators, and all three should work in loyal coöperation toward the achievement of a common success. To take another forward step on the road that has led from Daguerre's first photograph on a metal plate about a century ago to the motion picture viewed by millions today is surely a stimulating purpose.

The motion picture as it is seen on the screen is an optical illusion, that is, there is really no action within any picture itself. What is really seen is a series of still pictures projected on the screen in rapid succession, at the rate of sixteen pictures per second. These still pictures fly by at such a rapid speed that the objects or persons seem to move, or walk, or talk. This phenomenon is the result of a slight defect in the vision of the beholder. This defect in vision, known as the "persistence of vision," though still an unsolved puzzle, was recognized by the early Greek philosophers, and scientists have experimented with it through the ages. When the eye looks at an object which is suddenly removed, the impression received on the retina of the eye lingers, and the brain "persists" in seeing the object for a fraction of a second (some say for one sixtieth to one eightieth of a second) after it has entirely passed from the field of vision. Therefore, it was reasoned, if a series of pictures could be flashed before the eye rapidly enough one picture would blend or merge into another in such a way as to produce the illusion of a continuous picture. This knowledge has been utilized for many years, in producing novel toys for

children, such as the so-called wheel of life, or the zoetrope. This consists of small cylindrical devices in which are placed a series of drawings of one object or animal in different stages of activity and which, when viewed through little peek holes in the side while the cylinder is being revolved rapidly, give the impression that the little figures actually move.

Probably the first scientific application of this principle was made by Eadweard Muybridge in 1878. Many are familiar with the story of how Mr. Muybridge proved to his own satisfaction that a motion picture was a logical possibility. In order to analyze the movement of a race horse while in the act of running, Mr. Muybridge succeeded in taking a series of photographs of a race horse in action on the old Stanford race track at Palo Alto, California. Twenty-four cameras were placed at short intervals along the track, and a string fastened to each shutter was stretched across the horse's path. Thus the speeding horse broke each string and snapped the camera shutters when he was directly in front of the lens. A close study of these twenty-four photographs moving in rapid succession on a screen so encouraged Muybridge that he spent many years experimenting, until he finally, with the aid of others, perfected the instantaneous photograph which made possible the motion picture of today.

Among the Europeans who were also experimenting along this line was Dr. Etienne Jules Marey of Paris. His notable invention of a camera which was capable of taking several exposures per second through a single lens was a most important contribution.

The great handicap of these early experiments was the use of the glass plate, which was cumbersome and breakable. It was not till George Eastman, of Rochester, New

York, with the aid of others, perfected the flexible celluloid film in 1889, that the ultimate success of the motion picture was assured. With a continuous flexible ribbon film available, Thomas Edison then completed his kinetograph, or recording machine, — a camera for taking motion pictures by use of the swiftly unrolling film. Closely following this achievement appeared Edison's kinetoscope, the device for showing motion pictures which created so much interest at the World's Fair at Chicago in 1893. Although this may be considered the first real motion picture, the original kinetoscope did not project the pictures on a screen. It was rather an individual affair whereby one could look through a small magnifying glass and there behold a series of pictures rapidly moving in the most lifelike manner. It remained for C. Francis Jenkins and Thomas Armat in America, Antoine Lumière of Paris, and others, working individually and coöperatively, to add their scientific contributions to the application of the basic principles that the inventive mind of Edison had given to the world, before finally a motion-picture machine was perfected which actually projected enlarged pictures on a screen. The available knowledge regarding the stereopticon lantern, which had long been in use, greatly facilitated the accomplishment of this final step. It is recorded that the first public motion-picture performance was given in New York City, April 27, 1896, although Mr. C. Francis Jenkins had exhibited his films to small groups as early as 1893 in Washington, D.C.

From the days of the first nickelodeons in 1903 the motion-picture theater has been an established institution, and has furnished the sole recreation of millions of weary toilers. According to a recent statement of Mr. Will Hays, the first motion pictures of a major event now on record are those of the inauguration of President

McKinley, on March 4, 1897. These were recently discovered in dark corners of vaults, and were reprinted and shown all over the United States, together with those of President Wilson's inauguration, in 1913.

The fascinating story of the marvelous developments which have been achieved in motion-picture photography since those early pioneer days of the little flickering picture of a speeding animal or a man riding a bicycle, appears to the average mind more like a weird Arabian Nights tale than naked truth. Indeed as a result of these achievements, the mysterious Ali Baba himself and his Forty Thieves have been actually resurrected, and perform all their magic tricks right before our eyes. There seems no conceivable magical feat or trick that cannot be portrayed on the screen. Nothing baffles the man behind the camera. He has become so skillful that he can reveal all the mysteries and beauties of the remotest corners of the globe. Before the magic screen one is carried thousands of miles over land and sea, and may watch how strange peoples of far-off lands work and play. American, Chinese, or South Sea Islander, all may curiously gaze at their world neighbors; for the motion picture is to be found in practically every corner of the globe.

Without the slightest inconvenience or discomfort it is possible to travel through the hottest tropics and the frozen Arctic, scale lofty mountain peaks, and look down into great yawning craters at boiling, seething lava. Dwellers of the inland mountain districts not only have the privilege of viewing the great expanse of the deep-blue waters of the ocean, but they may see the huge billows rise and swell and then break upon the cliff in foaming whiteness or roll madly toward them on the beach so realistically that they are half tempted to scramble out of their way.

The motion picture eradicates time, and carries the

beholders to the days of their forefathers, to relive the struggles of the dark days of the French Revolution or of the Plymouth Colony; it bears witness to the heroic perseverance of grandparent pioneers forging their way across the great plains in the old covered wagon to seek new homes in the unknown West. History has today no more valuable handmaiden than the motion picture.

FIG. 69. A bird's-eye view of Manhattan Island, New York

What the motion-picture camera reveals from the airplane. (Courtesy of the Aëronautical Chamber of Commerce, New York)

Step by step new developments have been added to this seemingly limitless force, making it more effective and thereby more useful to man. By means of the microscopic attachment, which magnifies minute organisms fifty thousand times the natural size, germ life or minute insects may be studied in detail upon the screen. The telescopic attachment for long-range photography, used particularly in the airplane, makes possible views of great stretches of mountainous country at one time, and has

also enabled scientists to photograph birds and timid or ferocious wild animals in their native haunts (Fig. 69).

The motion-picture camera may also penetrate opaque masses by the use of the X ray, revealing the little caterpillar dexterously spinning about its tiny body the threads that form the inner lining of its cocoon (Fig. 70). The X ray has conferred a great boon upon the human race, for it has enabled the physician and surgeon to photograph the action of the various human organs. Medical students may study from the screen, over and over again, heart action, circulation of the blood, or the process of digestion.

The development of the slow motion picture is a great contribution to science and education in general. These pictures are taken by means of an ultra-speed camera which may take ordinarily one hundred twenty-eight pictures instead of the usual sixteen per second, and thus many more pictures are taken of one motion. When these films are projected on the screen at the normal speed, the movement is so slow that it is possible to analyze it in detail. This slow motion may reveal the graceful movements of a swimmer in action, of birds flying, the unfolding of flowers, or the minute movements of intricate mechanism.

FIG. 70. A section of a motion picture showing the unfolding of the monarch butterfly

Courtesy of the Society for Visual Education, Chicago

Within the last few months there have been rumors that there is now being perfected in England a rapid cinema camera which is capable of taking from two thousand to three thousand pictures per second. With this new machine pictures were taken of a glass vacuum globe being suddenly broken by a hammer. It all happened in three five-hundredths of a second, yet the slow motion pictures revealed a most interesting fact; namely, that the globe burst on the side opposite the one which was hit by the hammer.

The motion picture in the public school. In its ability to stimulate vigorous thinking and a finer ethical discrimination during the acquisition of factual knowledge, the motion picture holds in the school system a position as legitimate as it is powerful. It arouses interest, holds the attention, and ordinarily compels the emotional as well as the mental comprehension that makes learning effective and enriches human relationships.

The fact that there are undesirable motion-picture films and that there are hindrances and difficulties in the way of the use of motion pictures in the schools should not overshadow the good of the better type of them and the benefits they offer the schools. It is far more effective to emphasize the positive and constructive than to dwell upon the negative and destructive. Lend your influence, give of your time, and work coöperatively to overcome obstacles.

The two most serious difficulties at present are probably (1) a lack of available material of the right sort which can be used effectively in classroom instruction; and (2) ignorance of the correct technique for its effective use.

The greater part of the existing wealth of motion-picture material has been produced primarily for commercial purposes. Much of it has considerable educational value, but it must be adapted to school purposes, re-

arranged, classified, re-titled, and in general made over to meet the needs of school children.

Parents and teachers do not attempt to pick out the "best sellers" of adult books, whether fiction or of a technical nature, and try to adapt them for the use of children. Long ago we realized the folly of such procedure. Yet there are some that persist in using adult picture material for great groups of young children. It is inconsistent; it is not pedagogical. A few school systems and several university distributing centers have made excellent headway, by buying from commercial dealers good educational films and definitely correlating them, through rearrangement and revision, with selected textbooks or subject matter.

Notable efforts have also been made by individuals and groups to produce pictures directly for school use. This is the ideal and the only truly efficient course to pursue. Outside of some of the excellent scientific films which have been produced for upper-grade instruction, probably the most outstanding and successful teaching films thus far produced are the *Chronicles of America Photoplays* produced and distributed by the Yale University Press. So even at the present time there is a limited amount of valuable material for intermediate, high-school, and college students, but there is almost nothing suitable for elementary children. Moreover, it is better, with the younger children, to use no films for classroom instruction until more suitable material is produced. These young children, it is true, need an abundance of visual materials in order to broaden their experiences and to bring before them a great number of correct mental images, but there is an adequate supply of other types of visual aids, such as the exhibits, flat pictures, stereographs, and colored slides, and for the present it may be wiser to make use of these only.

The situation is far from discouraging. Several commercial firms are already at work preparing film texts that will supplement and correlate with every subject in the curriculum.[1]

Suggestions for using motion pictures. Like the stereopticon slide the motion picture may be used with varying degrees of effectiveness in any one of the three steps in developing a lesson.[2] Generally speaking, however, a good educational film contains too much valuable information and too many new ideas to be comprehended or remembered by any student who has not first had a thorough background for understanding and appreciating the content of the film to be studied.[3]

1. *Introduction of new subject matter.* Although films may occasionally be used profitably to stimulate interest in new subject matter in geography, history, or nature study, actual tests have proved that only general impressions are gained, not genuine knowledge.

Such an introduction to some types of subject matter, however, may arouse curiosity and furnish the incentive for attacking new problems.

For example, before taking up the study of South America, the teacher may wish to impress upon the minds of her pupils the idea of the importance and progress of our Latin neighbors so that the class may begin its study more intelligently. Nothing can accomplish this so effectively as a good motion picture, portraying the beauty and grandeur of some of the progressive cities of South America (Fig. 71).

In that splendid film "Rio de Janeiro," by Burton Holmes, children are introduced to one of the most picturesque and charmingly located cities of the world. As,

[1] See Eastman Kodak experiment, pp. 404–407.
[2] See page 49. [3] See page 44.

by means of the film, they enter the great harbor, studded with lovely islands, they behold a magnificent modern city almost surrounded by jagged mountains covered with tropical vegetation. On entering the city they may be astonished to find the beautiful broad boulevards with rows of towering royal palms and lined on either side with

© E. M. Newman

FIG. 71. Rio de Janeiro, showing the municipal theater

huge buildings of the most modern architecture. They may be equally enlightened and charmed with the beautiful parks and botanical gardens filled with brilliant tropical flowers. It does not necessarily require preliminary preparation to appreciate and understand the content of a film like this; yet the general impressions made by it on the average mind may be deep and lasting. A genuine interest and motive may be born in the minds of the pupils, and more intelligent and purposeful study of South America may be the outcome.

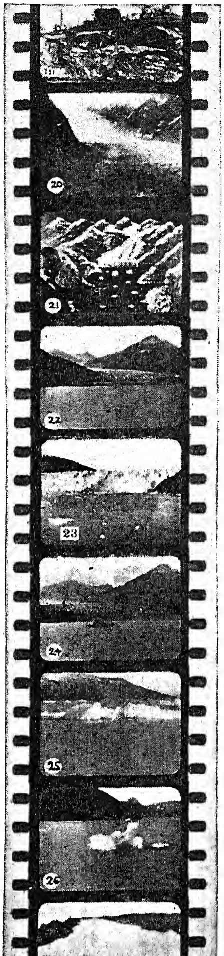


FIG. 72. A scene from the film "A Study of a Mountain Glacier"

Courtesy of the Society for Visual Education, Chicago

2. *Solution of definite problems during preparation of assigned work.* Here, perhaps, the motion picture offers its greatest service as an aid to teaching and learning. Since the film is capable of portraying processes and activities and broad panoramic views, it is the most effective and satisfying means of presenting the information urgently needed for solving problems and executing projects. In studying the geography of Norway, the problem may arise, "Why are there so many glaciers in Norway, and how were they formed?" Here is the time to introduce the excellent film entitled "A Study of a Mountain Glacier," in which Dr. Wallace Atwood, President of Clark University, has fully illustrated the process of glacial formation. Through chalk drawing combined with pictures of vast glaciers of the north, he has portrayed the formation of glaciers by snow, which falls high in the mountains and by its weight forms a slow-moving mass of ice. This mass of ice creeps down between the rocky walls, carrying everything before it, until it reaches the warmer waters of the ocean, where great pieces of ice, breaking off, form icebergs and float out to sea; or until it reaches a warm valley, where it slowly melts and forms a river (Fig. 72). No amount of reading

about glaciers from the printed page could ever convey the same concrete information, and no other visual aid could possibly bring the same degree of satisfaction as an educational film of this kind.

Such a film, good as it is, would have little effect educationally unless the children were ready for the lesson; that is, the pupils must have reached a stage in their study where they feel the need of the information the film contains. To be of the greatest service, a film that presents considerable valuable information should be projected at least twice for definite periods of study. Each presentation reveals new truths and arouses new interests, calling for more detailed study. Therefore after the first presentation, ample time should be allowed for coöperative discussion and extended research work before the second projection of the same film is given.

The second presentation of an educational film often secures more valuable results than did the first. It is during this second study of the film that any erroneous impressions may be corrected, and a better opportunity is afforded for comparison and verification of data. It has also been found that lessons are far more valuable if the teacher emphasizes a point here, or calls attention to an important fact there, that might otherwise be overlooked. Discretion must be used, as an excellent film lesson might be ruined by the incessant talking of a teacher.

3. *Review.* All children need as many opportunities to relive former experiences as can be provided, and the film is one of the most effective means by which information previously gained may be brought to mind and reemphasized. This use of the film has been discussed on page 56.

4. *The weekly assembly.* The weekly assembly, or gathering together of children of various grades, not only pro-

vides an opportunity for training in community singing and for sharing good work that is going on in various grades, but it also offers a larger opportunity for instruction in more general matters — good citizenship, health, nature, and travel.

The motion picture is an excellent means of imparting general information to large groups of individuals. But only certain types of films are suitable for mass training. Films of a technical nature and most industrial and historical films are entirely out of place, as they require definite preparation to be appreciated and understood; furthermore, as stated above, they should be used only when needed and only in the smaller groups.

Films that are used in groups of pupils of varying mental ability should be rather simple in content and yet entertaining, in order to capture the attention of all. Some of the finest lessons in patriotism are gained through stories or episodes. It is essential, however, for the story or episode to have an appeal. Films like "Hats Off" or "A Story of the Flag" are entertaining, and yet thrill every beholder with patriotic love for the sacred emblem of his country. They have the same effect on all ages.

5. *The assembly for a special occasion.* The motion picture may be used in the development of various special programs, of which the following are a few suggestions:

a. To celebrate Columbus Day a brief story of Columbus may be given by a boy dressed as the discoverer of America.

TABLEAU
Columbus at the court of Isabella.

TABLEAU
Landing of Columbus.

POEM
"Columbus," by Joaquin Miller.

Motion Picture

"Columbus," from *Chronicles of America Photoplays.* (Yale University Press Film Service).

b. A nature-study program for spring will inspire interest in insects, flowers, and birds. Develop a series of lessons for spring, treating one topic a day — for example, bees. Have one or two pupils give an introductory talk of about three minutes on the bee. A group of small children dressed as bees may sing the "Bumble Bee Song." Show one of the good films on bees, such as "Bees: how they Live and Work," distributed by the Homestead Films, Inc., of Chicago, or "The Honey Bee," distributed by the University of California.

Such films as the following are suitable for a series of such assembly lessons.

Butterflies

"The Monarch Butterfly," University of California, Berkeley, California; and Society of Visual Education, Chicago, Illinois.

Ants

"Ants," Pathé Exchange.

The Fly

"The House Fly," Ford Motion Picture Laboratory, Detroit, Michigan.

Spiders

"Spiders and their Victims," Kineto Company of America.

c. A trip around the world may be made. Select four or five interesting countries that can be well illustrated by means of a film. Each teacher might be held responsible for one program a term. Develop one country a week by giving an introductory talk, a folk song or folk dance, and end with a well-chosen film of one reel. The program

ought not to last more than thirty minutes. As a culmination of the work, at the end of the term a spectacular pageant might be given, to which the parents are invited.[1]

The same type of a program might be carried out to develop an appreciation of America's national parks. Excellent films may be secured at almost any distributing center.

Motion picture and excursion compared. Both these visual aids convey concrete information which is needed to bring complete satisfaction to the learner — a satisfaction which cannot be gained so economically or so effectively in any other way. With both, the individual comes face to face with processes, activities, and realities in life itself. With both, a background is essential to their largest usefulness. The printed page should be consulted, and there should be a preliminary understanding of purpose and subject matter. The excursion has the advantage of permitting the exercise of the sense of touch, whereas the motion picture covers a wider range of subject matter.

Types and care of films. Technically speaking, there are three kinds of motion-picture films in use at the present time: the inflammable, the safety, or noninflammable, and the paper strip. The inflammable type, the type universally used in the theaters, is made of the highly inflammable materials, nitrate of cellulose, or celluloid, which contains guncotton and camphor gum. Celluloid of any kind, if exposed to intense heat or if a flame strikes it, flares up in a flash and burns very quickly. This does not mean that it will explode. In reality, it is not so dangerous as gasoline and kerosene, which are often left carelessly in some houses. Nevertheless it ignites very easily, and must be handled with extreme care. Reels of such film material should never be left out

[1] For choice of films see the catalogue "1001 Films," published by the *Educational Screen*, Chicago, Illinois.

of their metal containers, and when films are mended all scraps should be carefully disposed of. Professional experts claim that the nitrocellulose film is more pliable and transparent, and therefore produces a brighter picture on the screen.

The safety, or so-called noninflammable film, is made of acetate of cellulose, and when exposed to intense heat will blister and shrivel. However, if the heat is of sufficient temperature and is applied steadily for a few seconds, the film will burn, but very slowly. For this reason the acetate-of-cellulose film is highly recommended for school use. Nearly all strictly educational motion pictures in both Europe and America are now being printed on this safety stock.

Recently there has been developed in England a new type of film, known as the paper film. Its sponsors claim that it is absolutely noninflammable, is very durable, produces clear, soft-toned pictures, and costs one tenth as much as the celluloid film. The paper film has not had time as yet to prove its worth, but it may come to be the accepted film of the future.

All films are coated with a photographic emulsion on which the actual impression of the picture is made. The cellulose or paper is used as a flexible base to carry the emulsion, and it is very important that this base shall be both durable and highly transparent. The motion-picture film differs not at all from the film used in the ordinary camera. The original standard-width film is manufactured in long strips, two hundred feet in length, and one and three-eighths inches wide. It is produced in negative and positive stock. The original picture is taken on the negative stock. The films which are circulated for projection are printed from the master negative on positive stock. Sometimes several hundred prints are taken from one negative.

The motion-picture film is developed in much the same way as the ordinary camera negative. The positive stock is the same kind of transparent sensitized film and is developed in the same manner as the negative. Color effects are obtained, as a rule, by tinting and toning. The new natural-color photography will soon greatly improve the quality of our films.

With reasonable care, any good print should give satisfactory service for at least one hundred showings. It is claimed that some prints have lasted for one thousand showings. Everything depends on the care of the film. Expensive new prints have been torn and mutilated during the first few showings. All motion-picture films have sixty-four perforations or sprocket holes on each side of the standard film. In threading, each sprocket hole fits accurately over the sprockets of toothed wheels inside the projector. Any careless threading or improper adjustment of the projector may catch the fragile film and ruin many feet before the motor can be stopped. Rain marks, which are so annoying and cause eyestrain, are scratches in the emulsion. Often a particle of dirt or a worn spot in some part of the mechanism of a projector will leave a heavy scratch running the full length of the reel. It is very necessary, therefore, that the user of motion pictures should keep his projector clean, well oiled, and regulated.

A regular standard reel of film is one thousand feet long, and at the average speed requires fifteen minutes for projection. These reels must always be kept in metal containers. It is well to have two extra empty reels on hand. They cost but fifty or seventy-five cents each.

When a film breaks while a picture is being projected, the broken ends may be temporarily fastened together with small wire clips. If the film is not to be used again,

it may be returned to the exchange to be mended by an expert. The correct way to repair the break is illustrated in Fig. 73. The break must be repaired before it is used again.

Before the motion pictures leave the exchanges they are inspected, rewound, and made ready for use. On returning

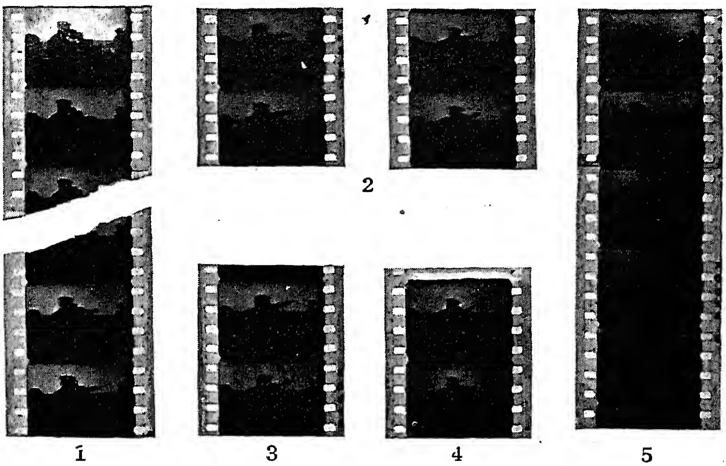


FIG. 73. The correct method of repairing breaks

The break is illustrated by 1. Cut along frame line in 2 and through first sprocket hole above frame line in 3. Scrape off emulsion of 3 as shown in 4. Put film cement on 4 and place 2 over 4. Apply film cement and press slightly for a minute. Repair should look as 5. (Courtesy of Edward Mayer, Extension Division, University of California)

films, it is not necessary to rewind them, as the exchange must rewind and inspect them before sending them out again. Users of films should be careful that the title band is replaced about the film before it is put into its shipping container. It is necessary that the return caution label be pasted on the outside of the shipping container. Films are rented by the day and should be returned promptly.

There are a certain number of tools necessary for the projecting of any film. They include a set of rewinds, film cement, a pair of scissors, safety-razor blades, and possibly a mending or splicing machine. All supplies may be obtained where the projector was purchased.

MOTION-PICTURE EQUIPMENT

It is not possible, necessary, or appropriate to discuss in detail in the present volume the problem of projection apparatus. It is rather the aim here merely to give educators who are not familiar with such problems a general idea of the kinds of projection equipment available and actually being used in hundreds of schools. Readers are asked to bear in mind, however, the fact that the motion-picture industry is still in the early stages of its development; and, as is the case with automobiles, radios, and other modern inventions, improvements are being made so rapidly that the best apparatus that can be recommended today may be entirely out of date tomorrow. It is therefore advisable for prospective purchasers first to study carefully their specific needs and to consult detailed descriptive catalogues of leading manufacturers of standard projectors; then they should investigate personally at least two or three well-recommended types of projectors before making the final purchase. It is also advisable to confer with several disinterested operators who have had rather extensive experience in the non-theatrical field.

An up-to-date model of projector ought to give any school excellent service for many years, provided a reasonable amount of care is given it. Ordinarily, machines owned by individual schools are not used more than one or two days a week.

The most important thing to decide in considering the purchase of a motion-picture projector is whether it is to be used in an average classroom or in a large auditorium where the projection distance is over fifty feet. Each of these differing situations requires its own type of machine.

Types of projectors. Of the many types and models of projectors which have been put on the market, comparatively few are being generally used in schools, churches, and clubs. Generally speaking, there are three main types of projectors for motion pictures, but there are many makes of each type. These three types are commonly classified as standard or nonportable, semiportable, and portable.

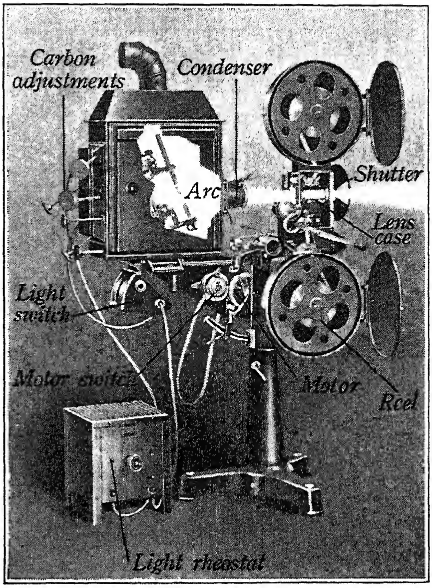


FIG. 74. A professional standard motion-picture projector

Courtesy of Compton's *Pictured Encyclopedia*

Professional standard projector. This large, nonportable projector is used in theaters and large auditoriums. It must be installed by an expert in a fireproof booth. Some are hand-driven, but those in common use in the nontheatrical field are motor-driven, and are equipped with incandescent lamps of from 600 watts to 1000 watts. Such a machine usually requires special wiring, and with the Mazda bulb is adapted to throw

a large, bright picture on the screen which is from sixty-five to one hundred feet away.

Although there are several good makes of standard projectors, probably the two most commonly used in school auditoriums are the Simplex and the Powers. These range in price from $495 to $900, according to special equipment and installation. The average price for satisfactory installation for school use is about $625 at the present time. This may differ according to locality.

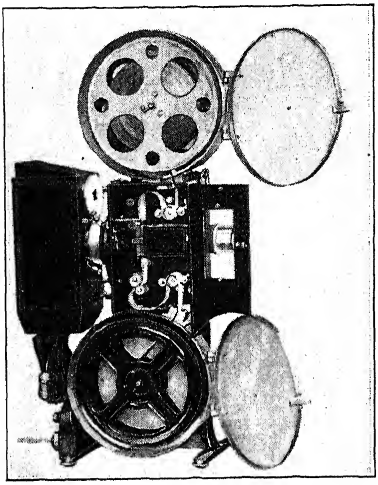


FIG. 75. A type of semiportable projector
Courtesy of the Holmes Projector Company

Semiportable projector. This type of projector is a practical machine for general school use. Since it is equipped with a Mazda lamp of from 600 watts to 1000 watts, it can project brilliant pictures any distance up to one hundred feet; therefore some models are adapted for both classroom and auditorium use. The average weight is from fifty pounds to seventy-five pounds, and the projector can therefore be moved very easily from room to room. One type stands on a tripod and resembles a small professional machine; others are incased in metal or asbestos-lined cases and are operated on a table similar to the ones used for the smaller portable machines.

The mechanism of the majority of these machines is similar to that of the professional standard type. Those

in common use are motor-driven, and use the standard 1000-foot reels. They are easily manipulated and usually operate on an ordinary 110-volt, 25-cycle to 60-cycle alternating current or direct current, or can be operated on a 220-volt current by means of a rheostat.

Like all portable machines these projectors can be equipped to operate from storage batteries or farm-lighting plants. As one manufacturer states, when no other electric power is available the projector can be operated on a 110-volt current supplied by a portable auto generator which can be attached to any automobile.

Ordinarily these machines must be operated in a fireproof booth, especially if the inflammable, standard film is used. Portable booths can be used in either auditoriums or classrooms.

As with the standard type, there are several makes of the semiportable projectors which use only the standard-width film; however, those most commonly used in schools and churches at the present time are the Acme S. V. E. Model, the Zenith, and the Holmes, also the new Super DeVry Model. The price of these projectors ranges from $300 to $375.

The portable projector. The portable motion-picture projector is the most ideal classroom type, and may also be used in small auditoriums where the projection distance is not greater than sixty-five feet. This machine weighs from twenty to thirty pounds, and is incased in a suitcase type of box covered with fabrikoid leather and lined with aluminum-coated asbestos. It is motor-driven, equipped with 400-watt or 500-watt incandescent lamps, and can be attached to any light socket in the home, school, or church. All the newer models have speed-regulating devices and still-picture shutters to allow the operator to stop the motor at any time so that students may

study more closely any single picture. Teachers have found this device a great help.

The mechanism of this projector is much the same as in the semiportable; the difference in the two types lies chiefly in the size and power of the lamp.

Since the portable cases are asbestos lined and are equipped with cooling devices or metal magazines which

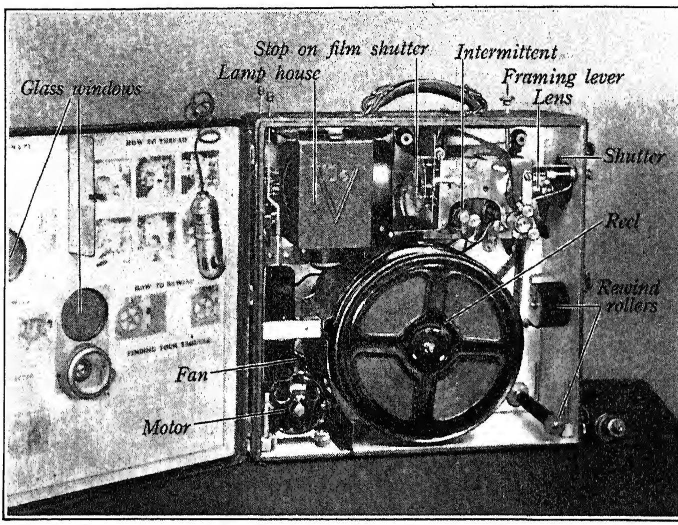


FIG. 76. Interior view of a portable projector

Courtesy of the DeVry Corporation

protect the reels, the fire hazard has been reduced. A few city fire departments have sanctioned the operation of some of these machines in classrooms without a booth, providing only noninflammable film is used.

The two portable models most commonly used in schools throughout the United States today are the Acme and the DeVry. These are priced at the time of this writing at $240 and $250 respectively.

With a suitable short focal lens, practically all portable projectors may be used in the average classroom in connection with the translucent screen, just as the slide lantern is used. The daylight projection is becoming more and more popular for every type of classroom use.

Narrow-thread projectors. Besides the above-mentioned projectors there are several makes of narrow-thread projectors which use only a narrow-width, noninflammable film. These projectors are entirely free from the local safety regulations, as they are entirely safe in any ordinary situation. Despite these advantages, they have certain serious disadvantages which should be thoroughly considered before purchasing this type of projector. The machines are equipped to use only a narrow-width film, usually one and one-eighth (28 millimeters) or five-eighths inch (16 millimeters) wide (see Fig. 78). Schools using only such projectors are therefore limited for their supply to certain libraries of so-called "Safety Standard," and are debarred from using the standard-width film ($1\frac{3}{8}$ inches), which is universally used in theaters, and also from using the large number of free films which may be borrowed from health centers, industrial institutions, and some departments of the United States government. It must be said of these

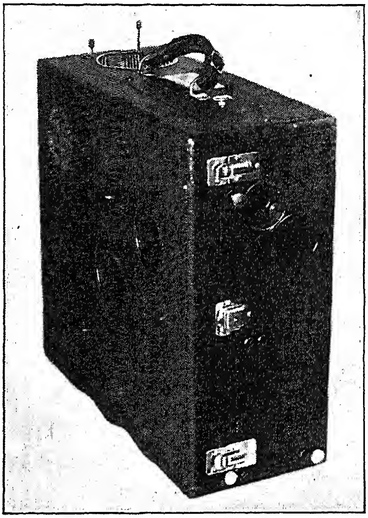
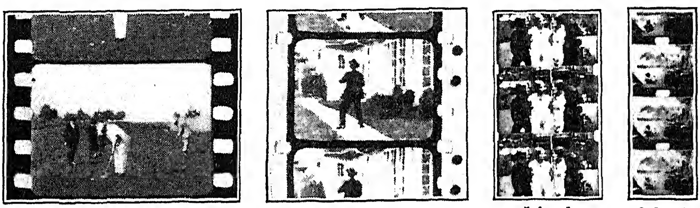


FIG. 77. Exterior view of a portable projector (suitcase model)
Courtesy of the DeVry Corporation

machines, however, that the quality of projection is good and the film libraries are practically the only agencies that have made an honest effort to meet the needs of the classroom. Some of these libraries are rich in variety of materials and, if judiciously used, can supply the needs of the average school. New reels are being added to these libraries constantly, and schools may add to their film collection just as they do to their slide or music record collection.[1] Schools that are isolated from standard-film distributing centers may find it of great advantage to



1⅜ inch 1⅛ inch ⅝ inch ⅜ inch

FIG. 78. Films of various widths

Courtesy of the DeVry Corporation

purchase a narrow-thread projector and a small library of reels which will correlate definitely with the subjects of the curriculum. Several small cities have invested in this type of equipment and report good service.[2]

The ideal projector. There are many excellent machines on the market which use both standard-width and narrow-

[1] The Eastman Kodak Company is now engaged in a noteworthy program of experiments with the narrow-width 16-millimeter film. A valuable library of strictly educational films and a specially designed motion-picture projector have been developed primarily for public-school use. This equipment is now being tested out in several large school systems which have had several years' experience in using motion pictures for classroom instruction. (See pages 404–407).

[2] A few of the commoner makes of these narrow-width projectors are the Victor, United Motion Picture projector, Pathéscope, American Projectorscope, Filmo Cine Projector manufactured by Bell and Howell Company, and the Eastman Kodak Company, Kodascope.

width film, but, as a rule, the models are too complex, and the elements of danger have not been entirely eliminated. The future projector must be practically fireproof and "foolproof." New improvements are being added, and entirely new models are being developed at the present time. The straight-thread portable type, such as the Holmes and Beacon machines, adds to the simplicity of threading. The new automatic devices of the Capitol motion-picture projector, which unwinds and rewinds the film automatically so that a film may be projected continuously without any adjustment by an operator, will also meet a definite need in many teaching situations. Progressive educators are also looking forward with great hope to the early perfection of the long-predicted stereoscopic motion picture and to the talking picture, both of which have already been demonstrated in various parts of the country. These new types of motion pictures will require entirely new types of projection apparatus. A great degree of interest is also being manifested in apparatus which is now being developed and, in fact, is already operating, whereby pictures are broadcast by means of the radio. (See page 418.)

Operation of projectors. Anyone who is capable of operating an automobile can learn to operate any type of motion-picture projector. Women teachers and women principals often operate the professional standard machines as successfully as the average man. Many classroom teachers operate portable machines in nearly every school system where projectors are used (see Fig. 79). Every operator, however, should be trained by an expert, and should be required to demonstrate his ability under the observation of an experienced operator before he is allowed to operate a projector in the presence of children. The most important thing is to be so familiar with the machine that its operation is practically automatic.

Constant alert watchfulness of both machine and screen must be unremitting. If anything unusual happens, the motor and power should be shut off instantly. All new models of machines are equipped with detailed directions regarding threading and operating. It is very necessary that projectors of all kinds should be kept clean and well-oiled. Every machine should be protected with a

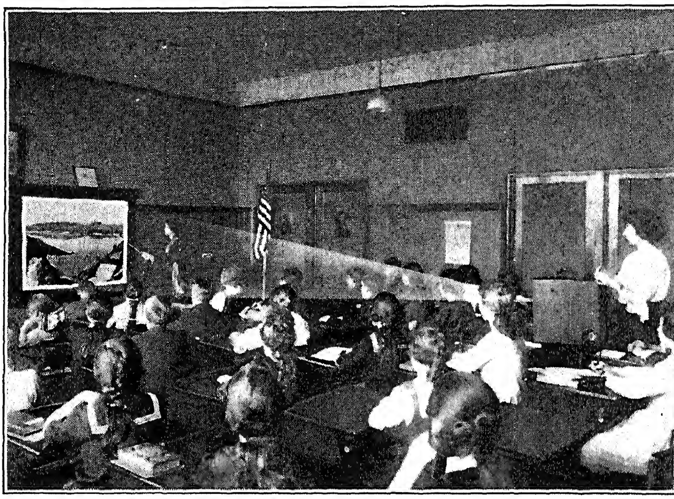


FIG. 79. A classroom teacher can easily operate a portable motion-picture projector

dust-proof cover. Extra electric globes should always be close at hand, as a bulb may burn out at any time.

Booths and wiring. All standard and most of the semi-portable and portable motion-picture projectors are required by law to be housed in fireproof booths. Some communities and fire-insurance companies make certain concessions for the use of safety noninflammable film. Practically all new school buildings are now being built with fireproof booths in their auditoriums and convenient

electric outlets in every classroom for portable projectors and slide lanterns. It is a serious mistake to overlook this equipment. Under no circumstances should the projection wiring be on the same switch with the lights of a room, especially if the projection is carried on in a darkened room.

Portable booths for classroom use may be purchased or can be easily made to order by any sheet-metal works for about $65 or $75. Experts recommend that such booths should be at least four or five feet square and six feet six inches high, and should contain two apertures, one for the machine projection, not more than six inches high by twelve inches wide, and one twelve inches high and six inches wide, through which the operator may constantly view the screen. A booth of this type can be made so that it can easily be taken apart and moved from room to room or school to school, but the services of two persons are required to set it up. However, the taking-down or the setting-up process requires less than ten minutes. The height of the projection aperture must be measured to fit the type of projector which is to be used in the booth. Both apertures must be provided with an automatic drop in case of fire. A removable sheet-metal shelf may be made to fit across one side of the booth to hold tools. Ventilators and special light-cords must be planned carefully.

All professional machines should be housed in permanent booths, which should be planned for in the original building scheme. Metal is cumbersome to handle, but many conservative fire departments will not approve the use of the asbestos cloth booths which are used in some cities. Both asbestos cloth and metal booths of portable size may be purchased from manufacturing concerns. (For list of dealers see Appendix.)

PROJECTION SUGGESTIONS

Oil projector thoroughly each day that it is operated.

Use only oil recommended by a reliable projection supply house.

Wipe off any oil which gets on the places which come in contact with the film.

Clean reflector, lamp bulb, condensers, and projection lenses each time before using projector.

Keep sprockets, rollers, aperture plate, and tension skids on aperture gate free from dust and emulsion particles. The film is sometimes scratched or otherwise damaged by hardened deposits of emulsion, which are scraped off the edges by the aperture-gate shoes. Use a soft damp cloth saturated with denatured alcohol for cleaning.

Keep machine covered when not in use.

Always keep the projector door closed and fastened when projecting.

See that speed control is at "Slow" when starting the motor and advance slowly toward "Fast" when desired speed is reached.

Be sure that the safety guard marked "Pull out" is adjusted correctly before closing the door.

The projector should be placed on a solid table or stand directly in front of the screen.

See that the motor switch and the light switch are turned off as soon as the end of the reel is reached.

If the film breaks or begins to burn, shut off the motor and light switch immediately.

Pull out extension-cord plug when not projecting.

Always carry an extra lamp and good extra reel. Most reels from exchanges are so old and worn that the use of them in a projector, especially on the take-up shaft, is inadvisable.

Make sure all reels of film have been rewound and that the emulsion or dull side is out.

It is best to use hand rewinds on a table, so that the film can be examined before projecting it a second time.

Always wind the film evenly and tightly; this preserves the film and assures even projection.

In rewinding a film, see that the shiny side is toward the hub of the reel.

Adjust your focus, frame up the picture, and test your projection before attempting to operate before a group of children. It guarantees safety and saves time.

A good reflecting screen is necessary to produce a clear motion picture.

Do not attempt to project too large a picture. With the ordinary portable projector using incandescent light, an eight-foot by ten-foot picture is very satisfactory.

The more you spread the picture, the less light you have per square foot of screen surface; therefore the smaller the picture the brighter it is.

Where amateurs are operating projectors, machines should be inspected at regular periods by the dealers.

It is wise to purchase only standard makes of projectors for school use. It is necessary to buy extra parts frequently, and machines must be serviced regularly.

PART II. VISUAL INSTRUCTION APPLIED TO THE TEACHING OF THE VARIOUS SUBJECTS OF THE CURRICULUM

CHAPTER V

VISUAL INSTRUCTION IN RELATION TO MODERN CLASSROOM PROCEDURE

> To you there is an obligation high
> And happy. Unto you the nation gives
> Her children, saying: "Lo! the treasure I
> Intrust to you!"

As was stated in the introductory chapter, this work was designed primarily to treat the problem of visual instruction and to show how its judicious use may enrich teaching and bring greater efficiency to learning. It seems wise, therefore, to pause at this point long enough to show briefly how modern methods of teaching procedure as practiced in the most progressive schools of the United States have been abundantly justified in the results achieved; and to point out also how the use of visual materials is not only helpful but vitally necessary to the successful practice of these modern methods that have so greatly increased efficiency in learning.

The significant key words in education today are "Why" (purpose of education)? "What" (content of education)? "How" (teaching procedures)?

The "why" in education. To determine the purpose, the aim, or goal, of education in any given year, it is necessary to look to society, the social organization, — which is, in the final analysis, life.

Herbert Spencer says the goal of life is "Complete living — living in the widest sense. To live completely means to be as useful as possible and to be happy. Usefulness means

service, and to be happy one must enjoy both his work and his leisure." John Dewey tells us "Education is not merely a preparation for life, *it is life*." Therefore both must have a common purpose.

Briefly, then, education in its larger sense aims to develop every individual into a wholesome, intelligent being. Its fundamental goal is the enrichment of life and the building of character.

"What" to teach. As has been seen in a foregoing discussion, the needs of society dictate to the school *what* to teach; and, as civilization is constantly shifting, so the types of knowledge — the subject matter needed to solve problems in current life — must also constantly change. Educators need, then, first, a clear conception of a desirable human society; second, a scientific conception of the nature of the child and how he develops. "With these two points in mind, experiences must be provided, fitted to the developing child, through which he shall establish for himself habits of living in a social order which grows toward this vision of this new humanity."

The "how" in education. Teaching procedures are by far the most important and the most difficult matters in the school's business and demand perhaps more conscientious thought and scientific study than any other one problem of life.

Upon the *how* of teaching depends not only the efficiency of learning, but also, to a great degree, the mental, moral, physical, nay, even the spiritual growth of the individual. If the procedure is formal and bookish, the educational effect will be merely lesson-learning, mere memorizing of facts often meaningless, and its repressive character, its failure to provide opportunity for creative self-expression, will react unfavorably upon the nervous system.

The modern school finds itself the principal agency of society for fitting the young to cope with the complex problems of life. The responsibility is great indeed, especially in the primary grades, where the habits, attitudes, skills, and ideals which are formed constitute the foundation for the whole future life of the individual. "The child is father of the man."

Bonser has said in treating this subject:

> A habit or attitude is formed as a result of meeting a given situation or type of situation with the same response or type of response so often and with so much satisfaction that when the given situation again appears the given response will tend to follow automatically.... Naturally the method of acquiring knowledge which makes its use most effective is through developing it in situations which themselves require it.[1]

During every school activity, therefore, every teacher questions herself critically, "What are these children getting out of this lesson? Is it concrete and meaningful to them? Are they growing and acquiring right habits, attitudes, and skills, or just facts for facts' sake?" The need for knowledge, useful subject matter, is of course not to be slighted or minimized. Every individual needs a wealth of useful information in order that he may function as an efficient social being. But it does mean that facts are of value only as they serve individuals to carry on interesting, purposeful, satisfying activities in school life and out-of-school life. The vital thing that counts, however, in school life is this: Are children gaining right habits, attitudes, and skills *while* they are learning useful information?

Self-education. The teacher, however, cannot force children to learn. Every normal individual is master of his

[1] Frederick G. Bonser, *The Elementary School Curriculum*, pp. 28–30. The Macmillan Company, 1920.

own mind. The most that teachers can do is, first, to provide a wholesome, happy, stimulating environment, where children may find rich opportunities for participation in purposeful, educative activities. Here the teacher may arouse an abiding interest and create a real hunger for knowledge and books. Second, when interest and desire are manifested, the teacher may teach the children how to solve their problems, how to study, how to use books, — in fact, how to live. Third, the teacher may and should provide abundant opportunities for self-expression and practice in using useful information. In the last analysis, this is practically all that teachers can do. Real education is a growth from within. Whether teaching is effective or not depends on the appeal of the teaching procedure.

It is of the first concern to teachers always to keep their thinking clear as to what are the objectives of life and education. If thought is clear and natural, normal processes and methods will almost inevitably follow, because they will be correctly motived; thus teachers are able to help children to live life abundantly.

Social efficiency. The school should be a workshop where children and teachers are happily engaged in interesting, educative activities, where they are learning to solve significant problems that are common to child life and to all socially efficient beings, where the child lives in the school as the adult lives in the world outside the school. Just what are the abilities and qualities necessary for a socially efficient citizen at this particular stage of civilization? The detailed list would be inexhaustible, but a few of the most vital, we would all agree, are to be able to think clearly and independently; to be able to assume responsibility; to have initiative and self-reliance; to have a keen sense of right and wrong and a sympathetic regard for the rights of others; to be able to lead and

yet to be able to take directions from others; to be obedient, honest, courteous, generous, and yet thrifty; to know how to work, to study, to use and treasure books.

The list already looks formidable. How can these things be attained? Surely only through real experiences. "Clear thinking emanates only from constant practice in thinking and right conduct from practice in right acting."

Various types of activities may be indulged in in order that adequate training may be received in the various phases of social efficiency. They are rather the outgrowth of needs that have naturally developed in a social group. These various types of lessons commonly known as a problem, project, appreciation, and drill lesson are ordinarily not definitely planned by the teacher.

Let us now consider the part visual materials can play in making these four types of activities concrete and meaningful to children.

THE PROBLEM ATTACK IN TEACHING

In life nothing worth while is ever accomplished save as a definitely outlined purpose or motive acts as a compelling force to secure the satisfactory completion of an undertaking. People do not work aimlessly; they have reasons for doing things.

For instance, a man suddenly feels the need of an automobile in either his work or his play. He now has an abiding interest, a problem, to solve. How can I save money enough to buy an automobile? What kind of automobile shall I buy? These problems necessitate deep thinking, planning, and studying before satisfaction can be gained. If he knows little about an automobile, he will probably first talk to his friends; he studies advertising pamphlets and pictures of automobiles; he visits showrooms to get

concrete information and to see the machine itself. It is not at all likely that this man would ever have sought this knowledge of automobiles had he not had a real problem to solve. There is interest in and purpose for his diligent study, which continues until complete satisfaction is secured by the selection and purchase of an automobile.

Even less than adults, do children waste their time making things aimlessly. A boy may spend days in his back yard making a coaster, not for the fun of making the thing, but because he has a problem to solve. Some of the other boys of his neighborhood are enjoying coasting down a neighboring hill; so he actually needs a good coaster. In school if we expect children to put forth effort and achieve, there must be a motive, a purpose, for study or for the doing of a piece of work.

All teachers know that it is real drudgery for most children to learn to write a formal business letter. But if a boy needs a sample of cotton for a project in which he is interested, and it can be obtained from a certain chamber of commerce, it soon becomes evident to him that he must learn to write a correct business letter in order to accomplish his purpose. Hence with keen interest he goes at it and soon learns to write a creditable letter. So in history and geography, if we expect fundamental learning, children must have a purpose for study and become whole-heartedly interested. The folly of assigning lessons by pages is fortunately rapidly disappearing in all progressive schools. No wonder there were poor lessons. What incentive did a child have to study? He opened his book during the study period to page 70 and found nothing to guide him or interest him, nothing but mere words. Within those little hieroglyphics which showed him where to begin and end, each paragraph, and each

sentence within the paragraph, was, apparently, of equal importance. *How* should he study? *What* should he study? He could not tell. So he mechanically committed it all to memory in order to recite it back to the teacher, and naturally soon began to lose interest in school and to lag in his work.

Suppose, instead, that problems have been presented such as the following: Mexico was discovered and settled long before the Western states; why has she not progressed as they have progressed? Why cannot cotton be raised in Montana? What kind of homes do Eskimos live in, and why don't they live in houses as we do? Then the student immediately has a reason for studying pages 70 and 71. The paragraphs and sentences which before were uninteresting become significant and reveal truths and information needed to satisfy a desire to know.

So today we are breaking up our subject matter into units and important problems. Children are learning to assume responsibility, to think, to judge, and to weigh values. Individuals and social groups in the progressive classroom attack their problems in the same manner that the adult does in life. They learn how to study, how to use many books, how to organize subject matter, and how to use tools in solving problems.

The school has become a laboratory, a busy workshop where children actually live and grow (see Fig. 80). "Growth is not something done to them; it is something they do," says Dewey.

A concrete example of procedure. The following is a brief outline of the procedure followed in a sixth-grade class in developing a problem. The class had been spending some time studying the larger problem of transportation by land and water.

One day in a social-group discussion a problem arose regarding the Panama Canal. "I read that the Panama Canal cost our government three hundred and seventy-five million dollars. I cannot see that it could pay our government to spend so much money on a canal so far away," said a pupil. After a brief discussion which revealed their very limited knowledge of the Panama problem, the teacher asked if they did not think it worth while to spend a few days gaining more accurate data so that they could discuss this problem more intelligently, since it was a very important matter not only to the United States but to the world at large. The group agreed, and the next period was set apart for planning and organizing the new problem so that work might be pursued logically and economically.

Coöperative planning of work, or assignment. This group was accustomed to organizing work and solving problems. To state it as briefly as possible, and eliminating the content of the discussions, the second period proceeded thus: Working coöperatively, the teacher and children questioned each other as to what they should know in order to solve their major problem intelligently. As the plan developed, the outline of the procedure was written on the board by the teacher. The following was the working plan:

Problem. Was the United States justified in building the Panama Canal?

1. Need and location of canal
2. History of the canal
    - French attempt
    - United States attempt
3. Geography of Canal Zone
    - People
    - Climate
    - Vegetation

4. Building of the canal
    Locks
5. Traffic
    Foreign
    Domestic
6. Cost, maintenance, and income
7. Conclusion or summary

With a clear conception of the work to be done, the next step was to apportion the work so that each individual could share a definite responsibility. Here individual differences were considered, and pupils were allowed to choose the topics which most interested them. In some cases two or three pupils desired to work up a topic together, — for example, the building of the canal and locks. This meant further responsibility as these pupils had to divide their work and responsibilities.

The laboratory period. The next two days the time allotment for this work was devoted to research work. Books were consulted, maps, pictures, and stereographs were studied very closely, subject matter was organized, maps and charts were drawn, and stereopticon slides picked out and classified as they were to be used by the pupils in presenting the topics to the group. It is in this part of the procedure that the teacher renders her greatest service, by giving advice, helping weak pupils to organize subject matter, and suggesting what books and pictures to use for a particular topic.

Solving the problem; recitation period. Every boy or girl finds pride and joy in talking to a group if he knows he has something new and interesting to say. Here he is able to contribute the many interesting things which he has discovered toward the solution of a big problem.

During this fourth-day period the members of this particular group wasted no time on any formal procedure

such as is staged in many so-called "socialized recitations." They had interesting work to do and went at it in a perfectly natural informal way. Nor did their teacher relinquish her position as their leader and helper. As the class assembled, immediately two boys quietly stepped to the windows and carefully lowered the shades while

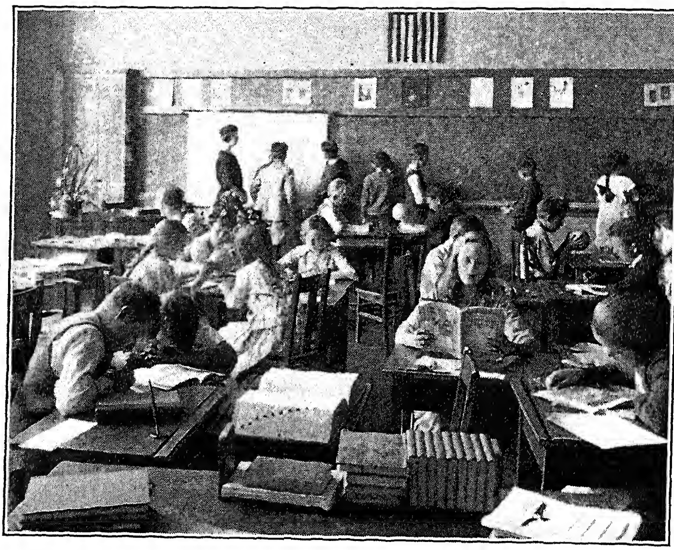
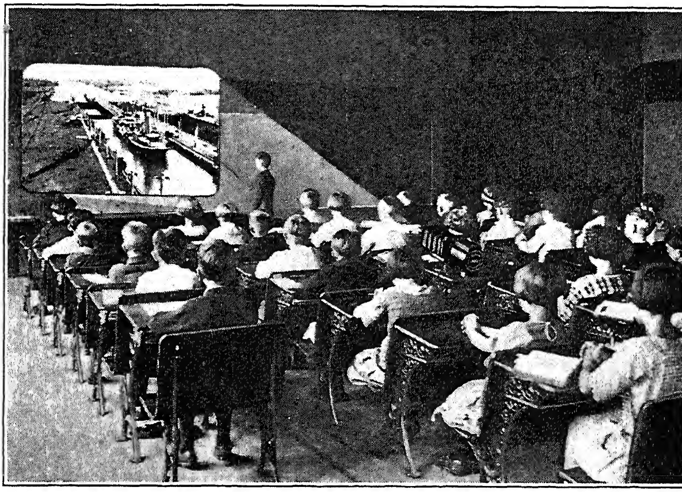


FIG. 80. During the laboratory period the classroom becomes a busy workshop where children are consulting books, maps, and pictures

another stepped to the stereopticon lantern and adjusted his focus on the screen. The first speaker announced his topic and its relation to the main problem. The room was light enough so that notes could be jotted down if needed, since every pupil was held responsible for the main points in every discussion. These were often emphasized and elaborated by the teacher.

The speaker spoke freely and with good poise; he told

the long-felt need for a waterway through the Isthmus of Panama. He used just three slides in his talk. One was a colored slide showing a section of the canal, which gave the group their first true concept of the canal itself. The second slide showed a map of the Isthmus of Panama with the Canal Zone outlined. This was well explained by



© Keystone View Co.

FIG. 81. How the lantern and slide were used in solving the problem relating to the Panama Canal

The lantern was placed on a desk and the picture was projected on the wall in a semidaylight room

the pupil, who pointed out every detail. The third slide showed an airplane view of the whole canal.

After each report an opportunity was given for questions, and many were asked by interested children really seeking information. The teacher also entered into the discussions that followed, and not only added information here and there, but asked questions concerning things about which she really wanted information. How pleased

these children were to be able to give her the information she sought! How glad they were to turn to the big picture on the screen in order to illustrate or prove a point!

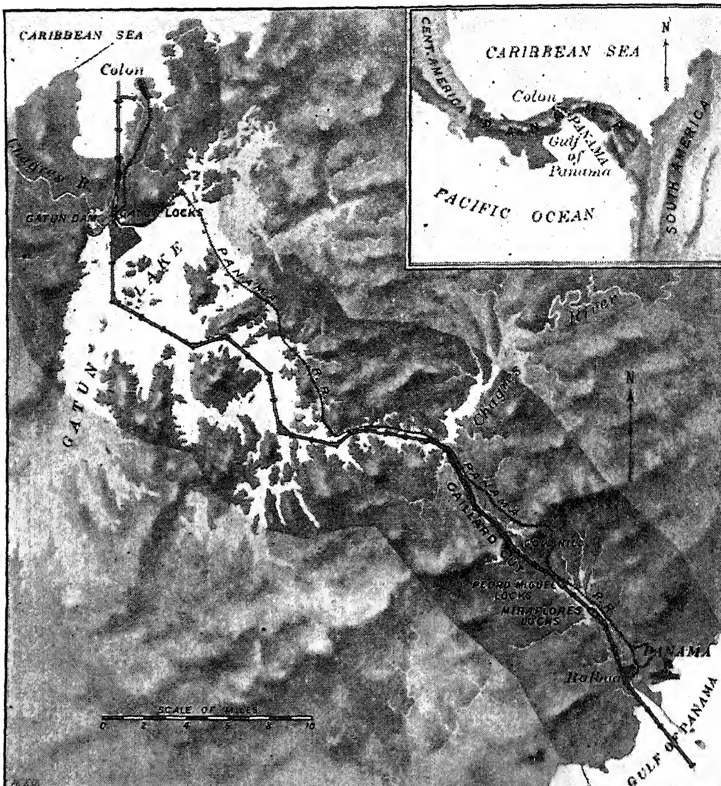


FIG. 82. Stereopticon map-slide used in developing the problem

So these interesting activities went on for several days, and each day's contribution toward solving the major problem was carefully checked until the conclusion was reached. Before the problem could be finally solved arithmetic had to play an important part. Therefore, a

whole arithmetic period was devoted to these practical problems, some of which involved business practices. The total cost of the canal was estimated, the maintenance per year, the average number of boats passing through the canal per year, the average annual amount received by the government for tolls, and so on. As a result all the pupils agreed that Uncle Sam had really made a very

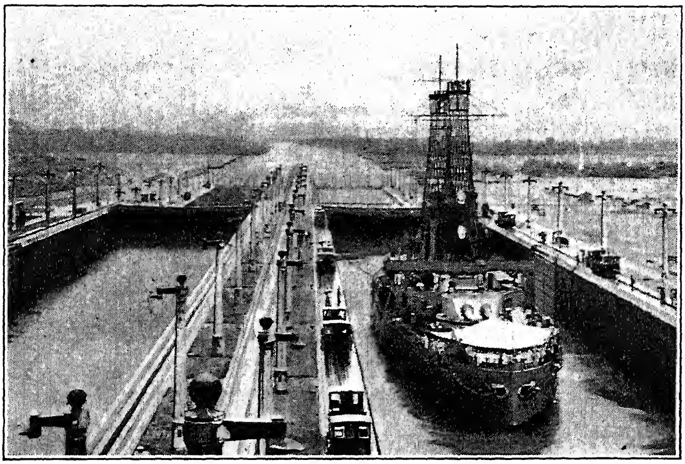


FIG. 83. The Panama Canal

A close view of what the pupils saw in the slide and stereograph

wise investment, and each had a great desire some day to travel through the canal to see in reality this interesting engineering accomplishment. A motion picture given at the close of this experience added a touch of realism, and greatly intensified this longing.

Visual instruction and the problem. It seems needless to say that this great interest could never have been aroused without a generous use of maps, pictures, stereographs, and slides. In fact, the gaining of accurate information

would have been utterly impossible for both pupils and teacher without these visual aids. Children are neither interested in nor can they talk about things that they cannot clearly see mentally. The fact that they had access to good stereographs, slides, and a film made it possible for every child visually to visit the scene in question, see the great Gaillard Cut, and the huge ocean-going vessels climbing up and down an eighty-foot elevation by means of the Gatun locks, with their great gates. Such information and vivid experiences could never have been gained from the printed page alone. Pictures brought every child into the presence of the problem itself.

THE PROJECT IN EDUCATION — WHY?

The project method [1] in teaching represents a conscious effort on the part of teachers and pupils to visualize learning activities. Every sand-table project is a visualized lesson. Making models, dramatizing historical or literary situations, are all attempts to recreate or objectify objects and activities that are outside present experiences. This form of visual instruction has, in the last few years, become immensely popular in the public schools. Yet the execution of projects consumes much time. Is it a waste of time thus to endeavor to visualize learning through this creative activity?

It is a truism that man learns to do by doing. No amount of study from a printed page would ever teach a girl how to make a dress unless she was sufficiently interested to apply the knowledge gained from the book to the actual making of a dress.

[1] The author here uses the term "project" as meaning a purposeful activity — an actual experience involving both constructive thinking and material doing — participated in by pupils in order to solve definite problems.

"All of the activities of life flow directly from native impulses or tendencies to behavior. These inherited tendencies in the form of instincts and capacities are the starting points for all educative experiences." [1]

It is a native instinct of children generally, to be mentally and physically active — to create, to imitate, to investigate, and so on. A normal healthy child, if left to himself, is never idle for any appreciable length of time. He is running, jumping, creating, or "make-believing" constantly. A seemingly trifling interest in some passing incident may so stimulate the imagination as to result in some organized activity. If a fire department happens to be called out in the neighborhood, amateur fire departments will be organized in back yards for several days following. If a circus comes to town, all interest is centered in a miniature circus in some vacant lot or barn. Those who have had the privilege of visiting such performances know that the genius and business ability displayed is often remarkable. No mediocre makeshift is tolerated; every detail is carried out as nearly like the adult's performance as possible.

Some time ago a young lad was found in his back yard busily engaged in trying to prove to his own satisfaction how a volcano really acts. He had heaped up a cone of dust and dirt and had arranged a section of old garden hose so that one end found an outlet near the cone of his miniature volcano while the other end lay on the ground. At this latter end the lad puffed and blew till his volcano belched forth dust in every direction. This lad had learned about volcanoes at school, but that was not enough. He had to satisfy his curiosity by means of a real experience before complete satisfaction was gained.

[1] Frederick G. Bonser, *The Elementary School Curriculum,* p. 38. The Macmillan Company.

In the last few years teachers have come to realize that they must study these natural tendencies and inherited abilities of children and make use of them for educative purposes. They must work with nature, not against it. It is most uninteresting and unnatural for any child to "sit up tall" in hard uncomfortable seats hour after hour. Adults don't do it in life; they are busy doing things. The value of the "doing experience" in the field of physics and chemistry was realized and taken advantage of years ago, but educators have been much slower to make use of it with other subjects. Scientific study of the nature of the child and how he develops, however, has convinced educators that school life must include training in real experiences, such as are natural to child life outside the school. These experiences are known in school life as purposeful activities or "projects."

There is a very close relationship between the problem and project, both in and out of school. A project usually grows out of a problem to solve. But its execution involves not only constructive thinking but material *doing.* This may be well illustrated from the world outside the schoolroom.

Several years ago a great problem presented itself to the people of Arizona. In the south-central part of the state there were thousands of acres of rich agricultural land. There was plenty of sunshine but no water. How could they get water? After much study it was decided that a great irrigation *project* would solve the *problem.* The result was the successful completion of the Roosevelt Dam near Phœnix. Irrigation thus made possible the conversion of a quarter of a million arid acres into fertile fields. (See Figs. 84 and 85.)

If school is to be a reflection of life purposes, then the school must offer rich opportunities for participation in

natural activities such as individuals and groups meet in daily life. There must not only be opportunities for abstract thinking and reasoning but also opportunities for experimenting, testing, and creating.

Types of projects. Two types of projects are natural to children working in normal situations. First, there is the original, or creative type, where children give concrete expression to their own imagination of places and situations in stories, — for example, building fairy castles after reading *Alice in Wonderland.* Originality is the chief quality here; reference to the work of others is of minor importance. Second, there is the reproductive project, in which children attempt to reproduce as accurately as possible a real place or thing or an actual event in history; for example, in order to visualize how Eskimo children live, a small group of second-grade children built an Eskimo winter village on the sand table. The igloo was made of little white sparkling blocks, and the ground was covered with glistening cotton. The Eskimos were dressed in fur. Sleds and kayaks were made as nearly perfect as possible. The creation of this miniature Eskimo home necessitated constant reference to pictures to insure accuracy in detail. Nothing could be left to the imagination.

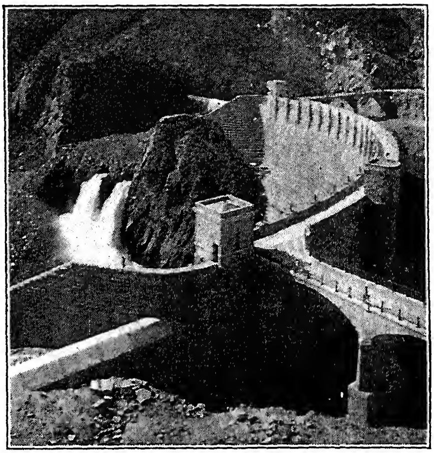


FIG. 84. Roosevelt Dam, Arizona
An irrigation project

In the problem on the Panama Canal described above (see Fig. 83), the two boys who had chosen the building of the locks as their topic decided that they could make their report more concrete and interesting by building a small model of the Gatun Locks and demonstrating how the locks operated. This they did, accurately and well; and

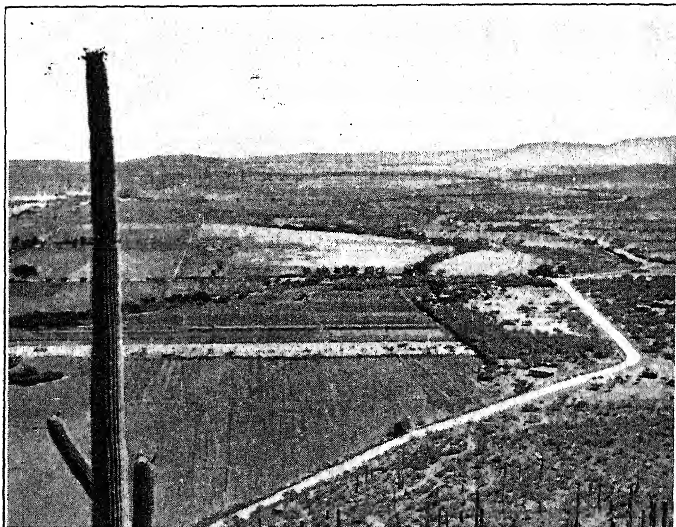


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FIG. 85. Salt River valley, showing the effect of irrigation in Arizona

The problem of water supply was solved

they gained far more knowledge and power from really executing this project than from any other part of the lesson.

Visual aids and the project. More than in any other type of teaching, the project necessitates a constant use of the best visual materials available. The project itself is a total visualization of the knowledge and mental concept of the problem in hand. If concepts are hazy and erroneous, the project lacks truth. For instance, in the

course of one project, the Nile Valley was reproduced, and the palm trees and camels towered high above the pyramids. A close study of a stereograph or a good slide would have prevented this error.

To participate in creative activities is a natural instinct, and produces effective results. Its value should receive a wider recognition in the teaching procedures. It insures

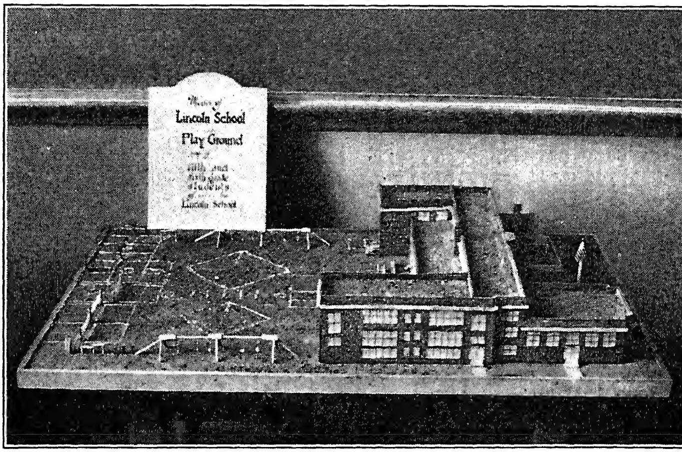

FIG. 86. A classroom project, Lincoln School, Berkeley, California

The fifth-grade and sixth-grade children of this school helped to plan the school playground

the acquisition of accurate, definite knowledge, and offers broad opportunities for the development of desirable habits, skills, and attitudes.

THE APPRECIATION LESSON

Work — purposeful activity — is necessary for growth and fullness of life, and the school should train the student to be an efficient member of society. But work is not the whole of life, and the marvelous inventions of a mechanical

age are continually shortening the hours of man's labor and lengthening his hours of leisure. It therefore becomes the responsibility of education not only to provide vocational training but to train as well for a right and profitable use of leisure. The use that the individual makes of his leisure, his personal appearance, the arrangement of the home, the books he reads, — all constitute a pretty good index of his cultural development. What he enjoys and appreciates is largely a habit bred of environment. The bull fight of Spain and Mexico makes little if any appeal to the child of France. But *good* taste and an appreciation of the natural, the beautiful, and the noble things of life can be cultivated and developed. The school that diverts the child from artificial devices — the thrilling "movie," the automobile race, jazz music and dancing — to the quiet ways of nature, the wholesome outdoor sports, the beauty of painting and sculpture, the music of song and finely written literature, such a school has well met its responsibility of educating for a rounded life.

This sort of teaching demands resourceful teachers of spiritual discernment and of radiating charm of personality, teachers who can win children to an interest in the inspirational things of life, and help them to know the joy of listening quietly in a care-free hour to well-read passages of beauty in poem or song or essay; it demands teachers who can develop in children an appreciative understanding of the various forms of art and literature. This is the kind of teaching required in the "appreciation lesson."

Appreciation lessons are ordinarily more effective if they are not formally planned, but are rather the outgrowth of some problem or project upon which the class is working. Thus they enrich the activity and orient it in its relations to other aspects of life. Appreciation is

closely connected with the resources stored up within the individual. A forest-ranger stationed far off on a high mountain peak may find life miserable and lonely or rich and abundant. This depends on his acquired habits, his store of knowledge, and his ability to appreciate. If he is in the habit of depending upon exciting material devices or upon human beings for his enjoyment, then he is most miserable, indeed; but if he has learned to see beauty in nature and the great out-of-doors, then his life on the mountain top is rich and full. He finds joy and satisfaction in studying the changing forms and shadows of the floating clouds as they pass by. The birds, insects, flowers, and trees are his friends and companions.

Visual instruction in relation to appreciation lessons. Since the general aim of an appreciation lesson is to inculcate high ideals and a love of the beautiful, they should be absorbingly interesting and appealing, for they must cause the listener to think and feel deeply. Therefore all appreciation lessons must be of a very concrete nature. Visual materials are invaluable in presenting such lessons, and the most valuable of these materials at present are exhibits and stereopticon slides.

In the first place, the large colored picture on the screen brings to a focus the attention of the whole group. In the second place, the picture on the screen brings into the presence of all for a definite length of time, the reality itself — the person, place, or thing under discussion. This experience alone commands attention and arouses curiosity to look farther and know more.

For example, a group of upper-grade pupils were discussing the Peace Conference at Versailles which ended the World War of 1914–1918. The alert teacher felt it worth while to digress from the main point of interest long enough to enrich the pupils' experience by means of

an appreciation lesson on this beautiful palace, which has been the setting for so many interesting events in French and world history. With a few artistically colored slides she led the group up the great broad staircase into the huge halls and galleries of the palace (Fig. 87). They visited the chapel, the theater, the Battle Gallery — that immense room lined with paintings representing famous French victories; then they rested some time in the famous banquet hall (Fig. 88) where the statesmen of twenty-seven allied countries sat discussing the terms of peace and reparation that should be imposed upon Germany and her allies. From the palace the group passed out into the magnificent garden, with its many winding paths through the thickly wooded terraces. They marveled at the many fountains, and were charmed with the quaint little cottage called the Little Trianon, the beloved playhouse of Marie Antoinette.

After this instructive and inspiring lesson not only were new appreciations developed but the Treaty of Versailles was given a setting which made a lasting impression on the minds of every pupil in the group. It is safe to say that the interest, appeal, and effectiveness of the lesson were enhanced a hundredfold by the use of the slides.

Again, a class that was studying "Evangeline" came to these lines:

> Anon from the belfry
> Softly the Angelus sounded, and over the roofs of the village
> Columns of pale blue smoke, like clouds of incense ascending,
> Rose from a hundred hearths, the homes of peace and contentment.

The question arose, "What is the Angelus?" The teacher did not say, "Oh, that is the call for evening prayer," and let it go at that. She had foreseen the need; she was ready to meet the emergency, and seized the opportunity for an appreciation lesson in art. A delightful

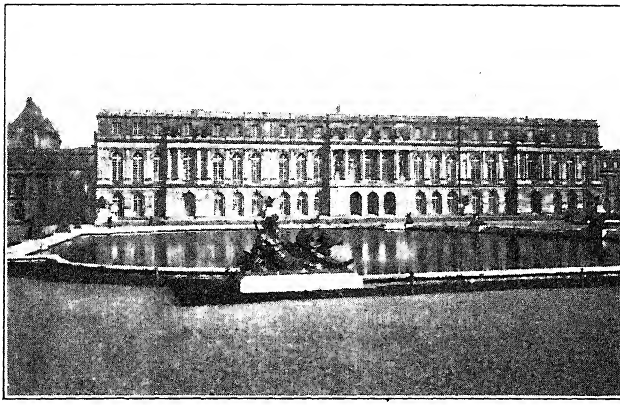

FIG. 87. The Palace of Versailles

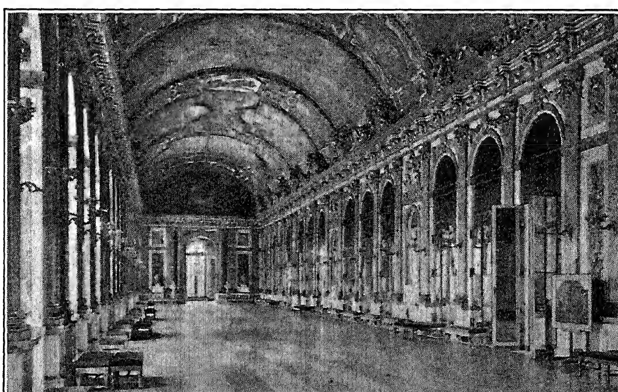

FIG. 88. The Gallery of Mirrors, in the Palace of Versailles

way to study a great masterpiece! So for a few moments they laid aside their books, and with a splendid copy of Millet's "Angelus" (see Fig. 89) (a large screen picture would have been much more effective) before the class, the teacher related the interesting story of the poor farmer boy who lived in Normandy and of his long struggle before he became the famous painter. She emphasized particularly how he failed to succeed until he went back to live with the simple peasant folk whom he knew and loved so well. Here he found the inspiration which made possible his great masterpieces — "The Man with the Hoe," "The Sower," "The Gleaners," "The Water Carrier," and "The Angelus." The significance of the Angelus was then explained, and the result seemed satisfying.

FIG. 89. The Angelus

From a painting by Millet. (Courtesy of the Brown-Robertson Company, Incorporated)

Then this same class came to these lines:

Fervent and deep was the voice of the priest, and the people responded,
Not with their lips alone, but their hearts; and the Ave Maria
Sang they, and fell on their knees, and their souls, with devotion translated,
Rose on the ardor of prayer, like Elijah ascending to heaven.

At this point the school phonograph, which had been wheeled into the classroom beforehand, poured forth the sweet notes of "Ave Maria," sung by Alma Gluck. Thus

a new appreciation of beautiful music was born in more than one of these students.

There is no end to the opportunities for lessons in appreciation which present themselves in connection with the various subjects of the curriculum. Often in utilizing these opportunities the teachers may reach out into realms of life which would not naturally be treated in ordinary school work. In this way keen interest may be stimulated in some new field of thought, in art, science, sociology, or travel, the result of which may lead to individual or group activities.

Other appreciation lessons will be described in the chapters dealing with the teaching of geography, history, and nature study.

THE DRILL LESSON

Every practical teacher realizes the need of constant review, whereby opportunities are given students to recall and use knowledge formerly learned, thus fixing important information more permanently in the mind. Furthermore, practically all the recent scientific investigations on the learning process of the child have shown that a certain amount of mental and physical drill is necessary in order to insure the functioning of experience as a habit. Much incidental learning is, of course, gained through the daily experiences; but a thorough mastery of fundamental experiences comes only through constant practice and drill. Skill in the manipulation of numbers, in speaking and writing correctly, in performing certain activities, is the reward of incessant practice — persistent repetition with attention — until the habit is formed and the individual does these things more or less automatically.

But the mechanical drill of parrotlike memorizing of mere facts, all unrelated to life activities, has no place in

the new education. "The laws of learning apply to the drill lesson as well as to the other [teaching] procedures." Students are no longer required to solve pages and pages of abstract problems just as a species of mental gymnastics quite dissociated from any practical or cultural benefit.

The need arises, let us say, for the classroom teacher to operate a motion-picture machine. She learns to thread and operate the projector, but at first she is naturally more or less awkward and slow. So she practices the same operation over and over again until she has acquired skill and speed, and the manipulation of the machine has become quite automatic. The same principle is true with regard to children. As they participate in the purposeful activities of school life, they find themselves hindered by their lack of power and skill as well as of knowledge. In order to "carry on" successfully and keep up with ambitious companions, they soon appreciate their need of drill and yet more drill.

For instance, a boy starts out to make a large relief map of the United States. That it may be as realistic as possible, he wishes to construct the map on as large a scale as practicable. Here a great difficulty arises: he does not know how to reduce the actual miles to a workable scale for his small map. The teacher comes to the rescue. The principle is taught, and definite drill lessons in its use follow until skill is acquired.

The purpose of a drill lesson is to develop a skill or fix a habit, but mere repetition is by no means effective drill. Drill to be effective must have a purpose; in other words children must feel the need of the drill and enter into the activity with whole-hearted interest. This insures undivided attention. The elements of play and of competition can be employed here to great advantage. A drill lesson should not be allowed to lag and become irksome.

Short, snappy, enthusiastic drills of a few minutes are far more valuable than prolonged periods, where children become weary and cease to give alert response. The procedure should therefore vary constantly.

Visual instruction in relation to the drill lesson. As the drill lesson is ordinarily the outcome of an activity in which the need of greater mental or physical skill has been realized, visual materials do not usually play so important a part in this procedure as in other teaching procedures. Yet the use of concrete materials may very often enhance the value of a drill lesson by giving to it keener interest and greater meaning. Examples of this are given below.

A language drill lesson: use of the comparative and superlative forms of the adjective. On a large poster, paste sets of two attractive pictures of boys, girls, or trees of different heights; between these sets of two pictures, paste groups of three or four boys, girls, or trees of different heights. The boys, girls, or trees may be numbered or given names. As the teacher points to a certain group, the pupils may make short sentences using "taller" or "tallest." For example, "Jane is taller than Helen." "No. 2 is the tallest of the three trees."

On other charts, pictures of apples of different sizes may be used for drill in the use of "larger" and "largest."

Arithmetic lesson for beginners. Much interest is added to the otherwise monotonous drill in the multiplication tables and combinations if various picture charts can be made in which pictures of objects are substituted for the abstract numbers. For example, nine groups of three horses or three brownies and five brownies. Pictures for these charts may be gathered from various magazines such as the *Ladies' Home Journal*, the *Woman's Home Companion*, and the *Pictorial Review*. Other sets of pictures may be purchased for a small amount.

History drill lesson. For a review and special drill lesson on historical places of the Revolution, a series of stereopticon slides may be thrown on the screen, showing Lexington Common, the statue of "The Minute Man," Concord Bridge, Bunker Hill Monument, the old Washington Elm, formerly in Cambridge, the Old North Church of Boston, the Liberty Bell, and so on (Fig. 90). The teacher may call on individuals to give quickly an interesting fact concerning the picture shown. At another time pictures of famous people may be used; for instance, Washington, Franklin, John Adams, Jefferson, Hamilton, John Hancock, Paul Revere, and others. Such drills serve to revivify historical experiences and, by connecting definitely historical incident with a pictorial experience, deepen the earlier impression.

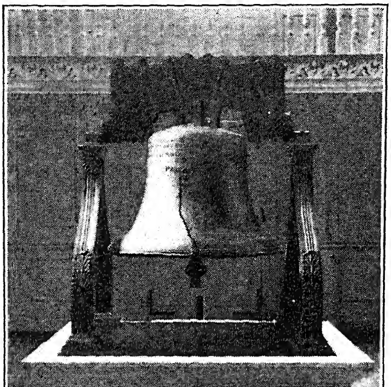

FIG. 90. The Liberty Bell

Slides may be used for a review and special drill lesson on historical places and situations

This brief discussion will be helpful, it is hoped, in suggesting to teachers many other valuable ways and means of using visual materials in making the needed drill lessons more interesting and effective.

CHAPTER VI

VISUAL INSTRUCTION IN THE SOCIAL STUDIES

Throughout these pages it has been emphasized that the needs of current life must very largely determine the subject matter which is taught in the public schools. As a result, a new interpretation of education and new methods of teaching have arisen which necessitate a broad use of visual materials to make certain types of subject matter impressive and effective.

In the daily activities of life outside the school, arithmetic, reading, geography, history, and civics are used as need arises in both work and play. Similarly in the schoolroom, it is soon discovered that hard-and-fast lines cannot be drawn between these studies, for the subject matter is very closely correlated. In solving the problems and executing the projects, the different subjects lose their identity. This is particularly true of the so-called social studies, because of their importance in the development of good citizens. However, to meet the needs of all teachers as nearly as possible, geography, history, and civics, although grouped under one chapter heading, are treated separately, but the reader will notice that close correlation is emphasized throughout the text. Since the problems of history and civics are so closely related that they often merge, these two subjects are treated under one heading. Specific civic problems for upper grades are particularly emphasized under the heading "Social-Science Problems for the Upper Grades" (pp. 276–284).

In order to set forth a certain point of view and guarantee a common basis for thinking, this chapter will discuss first the reasons for the present demand of a more thorough teaching of the social studies, and then proceed to illustrate how visual instruction will enrich such teaching.

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FIG. 91. Tropical hut made of parts of the coconut tree

Geographic environment has determined the type of houses and the material used in their construction

In earlier chapters the uses of the various visual aids were illustrated by concrete examples drawn from the fields of geography and history. The discussion here may therefore be of a general nature.

GEOGRAPHY

Scope and importance of geography. Geography is concerned directly with humanity and the world we live in. Its distinctive functions are to describe and explain the relation of man to his physical environment. Why do people live where they do? Why are the customs and activities of peoples, their food, their clothing, and their homes so different? Why are the natural resources, the plant and animal life upon which man depends for his very existence, so widely distributed over the earth?

The great problem of life throughout all the ages has been man's struggle for food, clothing, and shelter, and for

these mankind has been compelled to depend on the plant and animal life of the earth. Thus his mode of life has been determined by his geographic environment. He has built houses of reeds, bamboo, lumber, stone, mud bricks, skins, or whatever materials were available (see Figs. 91 and 92). He has clothed himself as climatic conditions demanded and as the materials obtainable made possible.

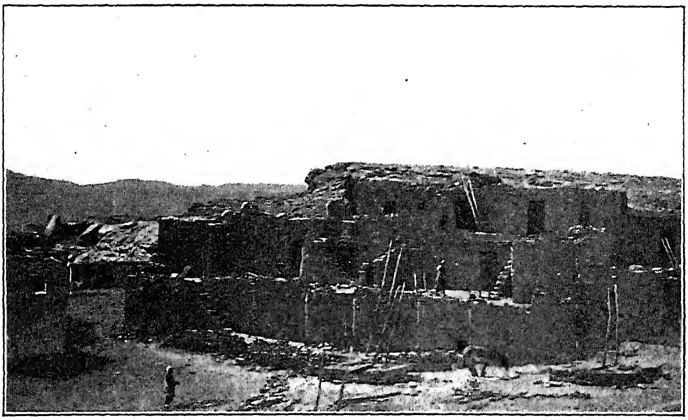

FIG. 92. A sun-dried-brick house of the Pueblo Indians

Climate has also been a dominating factor in the progress of civilization. Health and energy depend on climate more than on any other single factor. In a region where nature is kind, the people have prospered; if the struggle for existence is difficult, their development has been greatly retarded. History shows many instances of cultured peoples who, migrating from an invigorating climate to an enervating one, have soon slipped backward in their cultural status. A striking example is the Polynesian people, who, according to the claim of some ethnologists, wandered from the mainland of Asia to the islands of the Pacific, where they soon succumbed to isolation and

climatic conditions and failed to keep up to the physical or mental standard of their ancestors.

Geographic environment has a much greater influence than either racial or political divisions. Many times in history social or economic conditions have caused the human race to scatter over the world. The English people who migrated to Canada, to New England, to the southern part of the United States, to Bermuda, and to Australia were all of the same stock. Their present differences in customs, speech, and economic status bear eloquent witness to the controlling influence of physical environment. Again, the customs and activities of the people of the temperate lowlands are much alike, regardless of political boundaries; but they are very different from those of the people of the mountainous regions, even though they all belong to the same political unit. Another example is found in the development of ancient Greece. Historical Greece was a beautiful mountainous country overlooking the placid shores of the deep-blue Mediterranean Sea. Such an inspiring environment may have had an influence in developing lovers of nature, philosophers, poets, and sculptors. The topography and soil of this land did not encourage agriculture to any extent; so the Greeks turned their attention to herding and commerce. Thus, by adjusting themselves to their geographic environment, the ancient Greeks became one of the greatest and most prosperous of all ancient peoples.

The study of geography thus becomes the basis for understanding the ordinary problems of life. Moreover, it offers greater opportunities than any other subject in the curriculum for bringing about world peace, which is the most vital need of the whole world today, since economic and social disturbances are often caused by the geographic conditions.

The objectives in teaching geography. The outstanding objectives in teaching modern geography, particularly in the grammar grades, may be briefly summarized as follows:

1. The immediate aim is to impart useful geographic information which will aid individuals to perform the duties of life more intelligently and to enjoy leisure time more wholesomely.

2. The greatest need of the world today is universal harmony. The outstanding objective in teaching geography in every school throughout the world therefore ought to be to develop a sympathetic appreciation and understanding of the peoples and nations of the globe. The people of the United States, particularly, need to learn to think of the world as a whole, as the home of the great human family, and to realize America's present responsibilities in the family of nations. Racial prejudices grow out of ignorance and are best removed by understanding. The time to lay this foundation is early in life before prejudices have been acquired.

Visual instruction in teaching geography.[1] To attain these objectives realistic experiences are imperative. Students must be led to see, to feel, and to think deeply regarding such problems. Geography deals with conditions and relationships that influence life, and it therefore appeals to the emotional as well as to the intellectual faculties. Children cannot comprehend or appreciate strange foreign peoples, like the Persians, Japanese, or Filipinos, by reading facts about them in textbooks. Visual materials, such as pictures and maps, reveal not only how people live but explain why they live as they do, why some people till the soil and others herd cattle, sheep, and goats. Pictures

[1] A classified list of various types of visual materials may be found in Appendix B. Back numbers of the *National Geographic Magazine* have been listed and classified according to countries on pages 447–450 of Appendix B.

help us to visualize not only where wheat, corn, and rice come from, but how they grow and how they are prepared for use as food. The printed page may explain all these important facts, but pictures and exhibits portray conditions and activities so that they seem real. Greater curiosity and interest are aroused through actually seeing and feeling.

Thus it is becoming more and more clear that visual aids are indeed indispensable to the teaching of modern geography, and possess also the inestimable quality of speaking a universal language.

Distribution of content in geography. Most educators agree that there should be a carefully organized plan for the general distribution of geographic subject matter throughout the school life, in order that the definite goals may be reached in teaching geography in relation to other subjects. Broadly interpreted, this means that certain types of information may be allotted to each organized group to meet certain definite needs and interests of the children, and at the same time to develop desirable attitudes, ideals, and appreciations. Each advanced step in the educative process should offer opportunities for entirely new and interesting fields for study and research. Each teacher should have a clear conception of the definite objectives or goals to be reached with each group. She should then be left free and unhampered to lead children into interesting activities through which desirable habits, attitudes, and skills may be acquired at the same time that useful information is being assimilated.

It is a regrettable fact that in many places the teaching of geography has been confined primarily to the first six grades in the elementary schools. This important subject should indeed occupy a prominent place in the program of the elementary schools, for it is during that interesting,

impressionable age that lasting attitudes and appreciations are implanted in the minds and hearts of developing citizens. But the minds of elementary children are entirely too immature to comprehend the important geographic problems. Since the World War progressive schools are realizing this fact and are emphasizing this subject more and more in the junior and senior high schools. The distribution of subject matter is spread out over a longer period of time, and the result is a greater opportunity to study concretely a few important problems.

There seems to be a universal agreement that the study of continents and countries should begin in the fifth grade and should be completed by the end of the sixth or seventh grade, depending upon the number of years devoted to the study of geography in an individual school system.

Another point universally agreed upon is that continental study should be preceded by at least one year of preliminary study, in which the main emphasis is on the study of people in other lands.

The suggestions which follow are given on the assumption that two years are available for the preliminary study, and that three are available for the study of continents. In case the preliminary study must be confined to one year, the study of "Children of Other Lands" can be combined with that of "Food, Clothing, and Shelter." However if two years only are given to the study of continents, the second year's work must include a study of Europe, Asia, Africa, and Australia. Since the present tendency of teaching geography throughout the grades is a *one-cycle plan*, experienced teachers all realize how impossible it is to cover such an amount of subject matter in one year with any effective results.

I. Children of Other Lands

Objective. To acquire a keen interest in peoples outside the pupils' native land and to awaken a sympathetic appreciation of them.

Content. Little people of other lands.

It seems a serious mistake to begin the teaching of this subject with uninteresting facts about home geography.

Not long ago a mother complained that she was disappointed because her little eight-year-old daughter was having a serious, unhappy time at school with her geography lessons. She said that before taking up the subject of geography, the child had always seemed much interested in stories of foreign people, but at school the subjects discussed were soil, rivers, and mountains, and the little girl did not seem to understand the discussion or to take any interest in such subject matter.

Children of the third and fourth grade are only eight or nine years of age, and have hardly emerged from the highly imaginative stage of earlier years. They still crave life and activity. They are keenly interested in legends and fairy tales. The stories of strange and mysterious peoples of far-off lands fascinate them. This, then, is the proper time to present interesting lessons on foreign peoples. Here we have the finest kind of opportunity for "education for world peace."

The children learn for the first time that there are other interesting people in the world who work and play much as they do and who are in many ways like American boys and girls. They have loving mothers and kind fathers, and they play interesting games. However, because they live in a different part of the world, they eat different foods, wear different clothes, and often live in strange little houses.

It is well in this initial lesson to study types of people who are very different from the pupils because of different geographic environments, such as the Japanese, the Arab of the desert, the Eskimo of the frozen North, the French or Dutch of lowland Europe, the Norwegian of the highlands, the primitive people of the Congo, and the South Sea Islanders of the tropics. With such a wide range the children become familiar with various physical and climatic conditions and with their influence upon the lives of different peoples.

These first geographic lessons are of necessity simple and rather informal. They should be presented in story form and through the adequate use of effective pictures and exhibits. All the "home" geography that children of this age can appreciate comes incidentally through comparison of the food, clothing, homes, and activities of foreign people with those of their own in Oregon, Florida, Ohio, or wherever they may live. The questions constantly arise, Why do they dress as they do? Why do they ride on camels or in such queer carts? The answer must explain their habits and the reasons for them, and also offer an opportunity for the teaching of home geography through comparison.

Example of typical procedure motivated with visual aids. Holland has always been a fascinating country to young children. To them the canals, boats, dikes, and windmills are unusual and interesting. The quaint little Vollendam and Marken children, with their clumsy wooden shoes, become charming imaginary playmates. As an outgrowth of their study of the Pilgrims in relation to Thanksgiving Day, Hollanders became the motive for many interesting educative activities in a particular third grade just before Christmas. The children became curious to know who these people were and what kind of a country they lived in.

1. The study was introduced by showing the children pictures of the men, women, and children of Holland. After discussing their general appearance and comparing them with our own people, the teacher gave a short appreciation lesson on the history of these sturdy, thrifty people, who for hundreds of years have fought the waters of the bordering sea by building dikes of earth to keep the tides and waves from sweeping their homes away.

FIG. 93. The story the picture told

A brave Dutch lad discovered a small leak in the dike and risked his life to keep it closed until help came

At this point the teacher showed a delicately colored slide,[1] and on the small daylight screen appeared a picture of a Dutch boy struggling to hold his finger in a small hole in a dike. Then the pupils were told how in Holland even the children realize the importance of the dikes and the great danger of a break in them. They were told that every embankment must be guarded carefully to prevent a disaster.

This first lesson ended by reading Phœbe Carey's poem "The Leak in the Dike," in which the story is told of the brave Dutch lad who discovered a small leak and risked his life to keep it closed until help came.

2. With this background the class took up their storybooks ready to understand and appreciate the Hollander's country, customs, and ways of living.

Each day a new geographic problem was written on the board for thoughtful discussion in the group. At one time

[1] The slide was photographed from an old magazine picture.

they were interested in the dikes, canals, and windmills; at another the exterior and interior of Dutch homes; and at others in the tulip, the pottery, and the cheese industries. The problems were taken up as they were suggested in the reading of the stories.

Each day a new stereograph or a new slide was used to bring correct images and stimulate new interest.

3. "The people of Holland" was the theme or unit of interest, and all activities radiated about that topic for some time. In music they learned the Holland folk songs.[1] In physical education they learned a folk dance.[2] In the art class, they made lovely books in which they mounted pictures of scenes in Holland. For language, they wrote and told interesting stories of life in Holland. Some of the boys made windmills to see how they worked, and the girls made little Haarlem caps to be worn in a Christmas pageant.

During the study many interesting exhibits were brought in by both teacher and children, such as Dutch dolls, Delft ware, wooden shoes, and a native Haarlem costume.

The study ended with a Christmas drama in which the children dressed in true Dutch style, played they were little Hollanders, and celebrated Christmas just as the children do in the Netherlands.

Every detail was worked out carefully by consulting the descriptions in the story and by means of pictures.

These lessons brought about the following results:

1. The children gained lasting appreciation of Holland and its people.

2. They learned how some people make a living in a lowland of the temperate belt.

3. By traveling to Holland on a large globe the pupils

[1] "The Fisher," Victor record 72555, was used as an aid.

[2] "The Wooden Shoe Dance," Victor record 16839, was used here.

learned incidentally the shape of the earth and interesting facts about land and water forms (see chapter on how to read globes and maps).

4. Through motivated activities the children learned to handle books and to appreciate good pictures; also to write better, to read better, to talk better, and to work and live more coöperatively in a social group.

Besides a systematic use of a few good stereographs and slides the teacher made valuable use of plain and colored pictures portraying Holland life found in the following numbers of the *National Geographic Magazine*: June, 1901; September, 1908; December, 1910; March, 1923; January, 1915.

The storybooks used in the different groups were the following ones:

CAMPBELL, H. M. A. *Story of Little Jan, the Dutch Boy.* Educational Publishing Company.
MCDONALD, ETTA, and DALRYMPLE, JULIA. *Marta in Holland.* Little, Brown & Company.
PERKINS, LUCY F. *The Dutch Twins.* Houghton Mifflin Company.

II. FOOD, CLOTHING, AND SHELTER

Objectives. To impart a knowledge of the value and source of supply of our food, clothing, and shelter; to appreciate the interdependence of all peoples.

Content. Food, clothing, and shelter in relation to the world as a whole.

With a preliminary background established through a study of people in distant lands, children are prepared to delve into a few of the simple economic relationships that concern them as boys and girls. Naturally, these are first of a personal nature. They drink chocolate for breakfast and enjoy the fine-grained sugar on their cereal; where do these things come from?

Many teachers who have thought this problem through carefully and have had considerable experience in working with elementary-school children are of the opinion that as early as nine years of age a child is quite ready to appreciate and take an interest in a simple narrative of the history of his state, with its geographic setting. Here geography and history merge into one interesting theme. Why did people come to Kentucky or Utah? Where did they settle and why? What activities are people engaged in at the present time and why? The fascinating stories of adventure and romance connected with every state make appeal to boys and girls.[1]

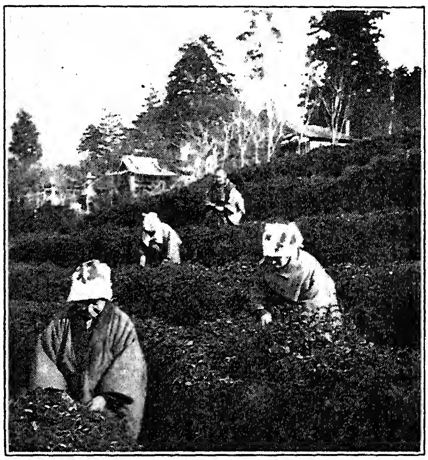

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FIG. 94. Japanese women picking tea, probably for the American market

The study of local activities brings up, naturally, the question of why our state does not produce all we need of food, clothing, and materials for building houses. The pupils have already learned that people settled in certain river valleys because the geographic conditions — soil, climate, and so on — made it possible for them to raise their wheat, corn, and fruit. But where are the sugar, tea, coffee, and cotton grown? Where does marble come from? To whom are we indebted for these necessary things? Thus pupils are led into interesting experiences that carry them all

[1] See the section on page 290 dealing with history.

over the world. To solve the problem of that cup of chocolate, they may travel to Ecuador, Brazil, Venezuela, Mexico, the West Indies, or tropical Africa, and visit thousands of acres of strange tropical trees bearing long pear-shaped pods, which contain often as many as fifty cacao beans (Fig. 95); and they learn that from these little beans the delicious chocolate comes. While studying this problem they learn about the geographic environment in which the cacao tree grows, and become acquainted with the natives of these tropical regions who pick and prepare for the market the cacao beans from which their breakfast chocolate is made.

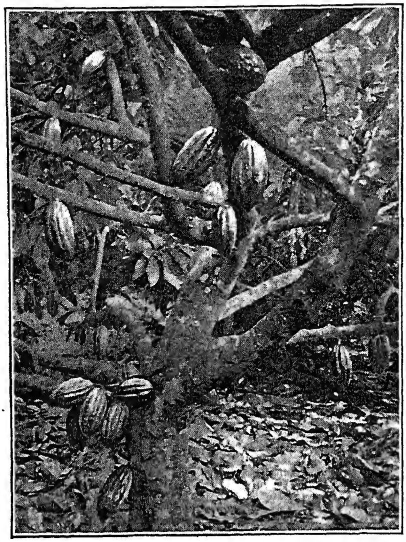

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FIG. 95. Cacao trees in Dominica, West Indies

The long pods contain cacao beans, from which chocolate comes

A lesson on sugar. One teacher started a term's work in the following manner: (1) The children were questioned as to what they had learned regarding the industries of their state. As the children responded, the items were written on the board. (2) Then they were asked what articles of food had appeared on their breakfast tables that morning. These were also listed on the board. The next question concerned the things which were produced within their state. These were checked off, leaving a list of articles that were imported, such as sugar,

coffee, tea, chocolate, salt, sirup, bananas, and so on. (3) Each of these articles was then studied in detail.

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FIG. 96. A field of sugar cane, Saint Kitts, West Indies

In the study of sugar the main problem was broken up into smaller ones; each of these was assigned individually for study. The following topics were reported on: history and kinds of sugar; use to man as a food; cultivation of sugar cane (see Fig. 96); refining of sugar; sugar plantations in Cuba, Hawaii, India, and the Philippines; beet sugar in United States and Germany; maple sugar in northeastern United States. Letters were written to a neighboring sugar-manufacturing company for booklets and samples. Other samples were also obtained from the Visual Instruction Depart-

FIG. 97. A field of sugar beets in the United States

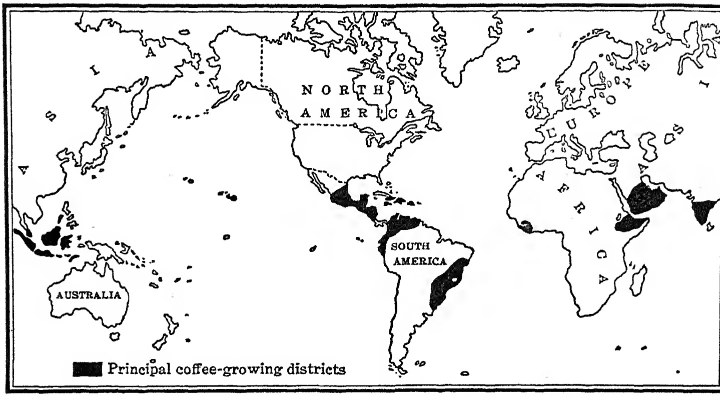

FIG. 98. The world's production of coffee, 1924–1925

Courtesy of Hill Brothers. Estimated from reports by United States Department of Commerce

Santos	9,749,077	Porto Rico	180,000
Rio de Janeiro	3,195,160	Jamaica	45,000
Victoria	907,619	Mexico	301,000
Bahia and Pernambuco	374,144	Africa	491,000
Colombia	2,221,000	Dutch East Indies	1,219,000
Venezuela	911,000	British East Indies	178,000
Ecuador	54,000	Arabia	136,000
Dutch Guiana	37,000	Straits Settlements	92,000
Guatemala	684,000	Hawaiian Islands	27,000
Salvador	768,000	Other small producing districts	89,000
Costa Rica	304,000		
Nicaragua	301,000	Total Bags (132 lb. each)	22,755,000
Haiti	491,000		

ment. Textbooks, reference books, and stereographs were consulted. A large map of the world was made on heavy wrapping paper, and small pictures of plantations of sugar cane, fields of sugar beets, and forests of sugar-maple trees were pasted in the correct locations. A long sand table was divided into three compartments; in one division was developed a Hawaiian sugar plantation with the natives at work in the field, in a second was a miniature sugar-beet field and mill (see Fig. 97), in

the third there was depicted a scene in Vermont showing how maple sap is gathered.

Importance of visual aids. It is again evident that not one step in the procedure described above could have been developed effectively with these young children without the use of exhibits and realistic pictures. Stereographs were used freely for individual study, and during each recitation colored slides were used by the children in developing and explaining their particular problems to the group. In this concrete way only can young children become interested in and really understand how people all over the world are toiling for one another to meet man's needs satisfactorily.

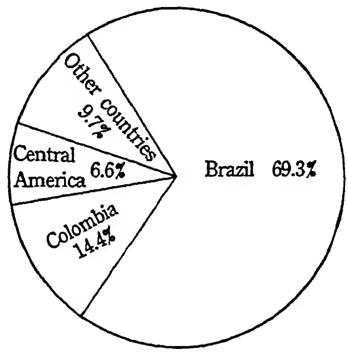

FIG. 99. A graphic chart showing what percentage of the world's coffee is produced in different countries

The motion-picture film is of tremendous value in developing these economic problems, as it reveals not only environmental conditions but processes. The element of life and motion completes the experience.[1]

Taking children on excursions to certain types of industrial plants, where they may see at first hand raw materials made into food and clothing, is also of vital importance in developing these types of work.

The simple bar, circle, and pictorial graphs should be developed and used freely to visualize not only where our resources come from but to show the comparative values and quantity of output of various parts of the world.

[1] For suitable illustrative material for this grade work see classified lists in the Appendix.

Books other than regular text may be used. The following are useful:

ALLEN, N. B. *Geographical and Industrial Studies.* Ginn and Company. (With help of teacher.)
CHAMBERLAIN, J. F. *How We are Fed.* The Macmillan Company.
KROUT, MARY H. *Alice's Visit to the Hawaiian Islands.* American Book Company.
TOOTHAKER, C. R. *Commercial Raw Materials.* Ginn and Company.
Article on sugar in Compton's *Pictured Encyclopedia.*
Industrial pamphlets from the California Hawaiian Sugar Company, Crockett, California. (Used with the teacher's help.)

III. CONTINENTAL STUDIES: NORTH AMERICA AND SOUTH AMERICA

Objectives. To impart a knowledge and develop a deep appreciation of our own country and its relation to the other parts of the American continent, and the world in general.

Content. North and South America with particular emphasis on the United States in first half-year; on Latin America in the second half-year.

The preceding study of the home state and its relation to the world in general ought to provide a basis for comparison and for keener appreciation of the beauties and opportunities of the native land and of the near neighbors to the north and south.

It is suggested that the concrete study of the United States and her immediate neighbors should not be postponed to a later period, since her future and theirs are closely bound together. They have problems in common. Economically and politically, present relations are intimate, and for the good of all it is evident that in the future there must be even more coöperation. This can only be brought about, as has been stated, by a mutual understanding of groups of peoples and their geographic environments.

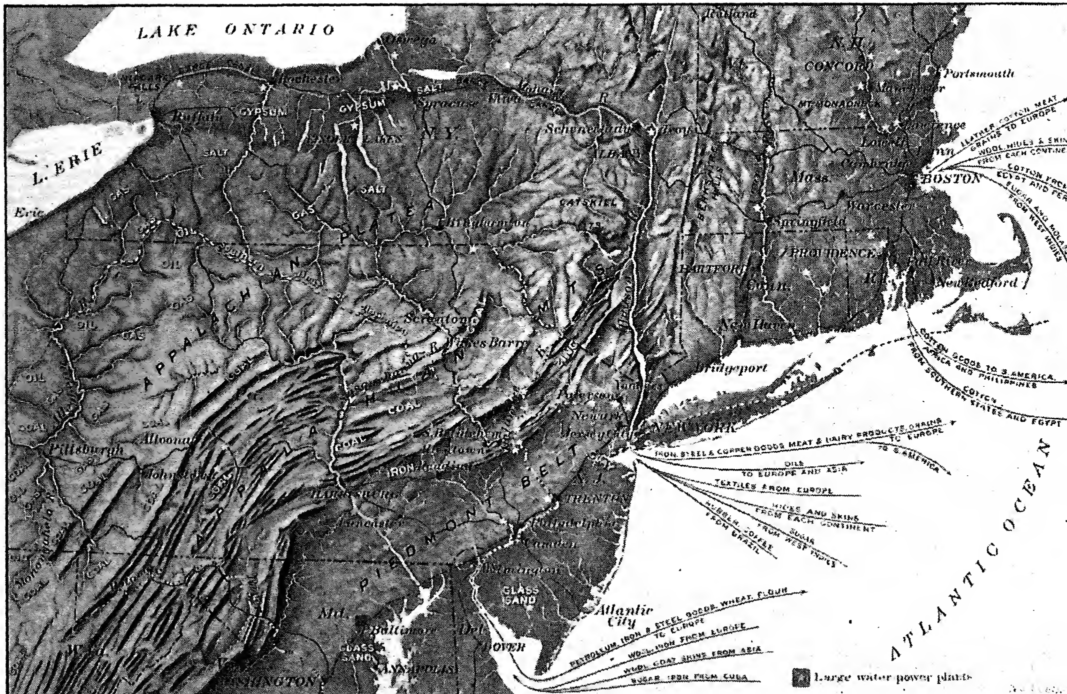

FIG. 100. A relief map of the northeastern industrial district of the United States

Since the deepest and most lasting impressions are made early in life, there seems to be an urgent need that the study of the human geography of North and South America should be taken up as soon as children are able to comprehend its simpler problems. This geographic information must be gained through participation in interesting experiences. The children must visit mentally each natural region in Canada, Alaska, the Mississippi Valley, Mexico, Guatemala, and Argentina, and there, through pictures, travel scenes, and storybooks, see people living in their particular geographic environments. There must be ample time allowed for concrete, detailed work in solving problems and executing projects that are worth while.

Suggestive problems. In less than one hundred and fifty years the United States has developed from a simple organization of thirteen colonies into one of the most influential powers in the world today. What has made this progress possible? What are the great natural regions of the United States, and how are people living in these regions? What effect have the great mountain regions had upon the settlement and industries of different natural regions?

The projects given below might be applied to any country.

SUGGESTIVE PROJECTS AND APPRECIATION LESSONS

1. On the floor or on a long table make a large relief map, with clay or papier mâché, of North America or some particular section (Fig. 100). Label and study the great natural regions. Use this large map as a basis, and as the work progresses, gradually locate and label the industrial and trade centers.

2. Draw a large outline map of the United States on heavy wrapping paper. Locate the great physical features, such as mountains and rivers, which have influenced the development of regions. As regions are studied, paste pictures of industries, ac-

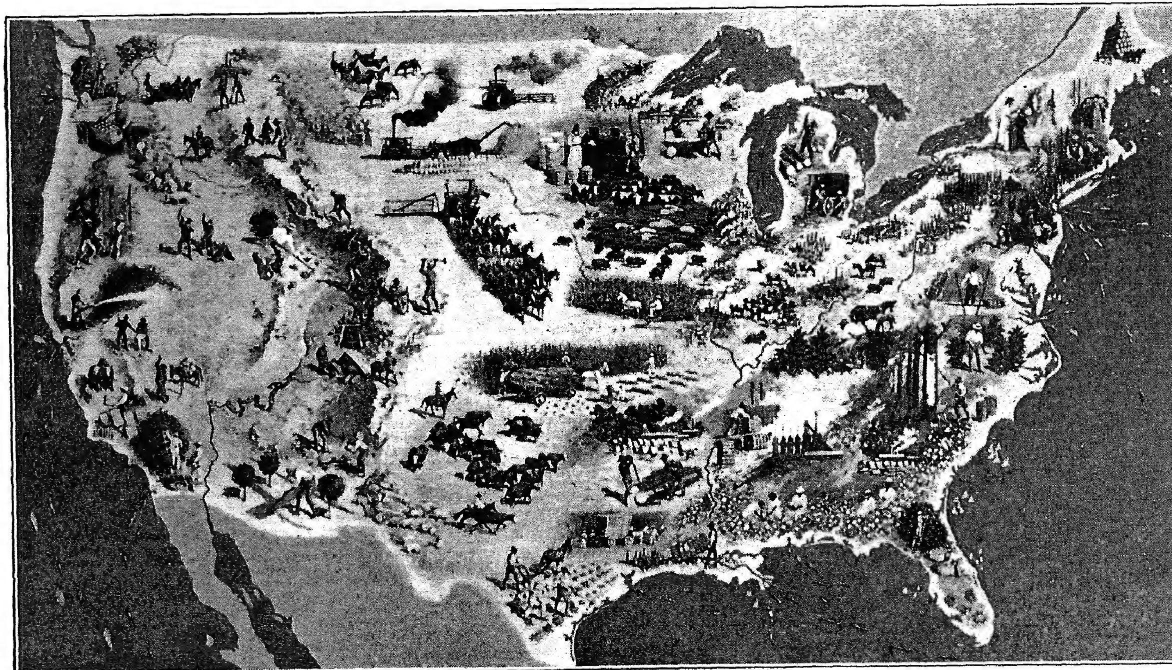

FIG. 101. A pictorial industrial map of the United States

tivities, and scenic beauties where they belong; for example, pictures of cotton fields in the South, sheep in Montana, factories in New England, coal mining in Pennsylvania, and so on. Real materials may also be used instead of pictures, as grains of wheat or pieces of cotton or wool.

3. Make a large or individual transportation map showing where the railroad lines, highways, canals, and steamship lines of each country are located.

4. On a large map, paste pictures of scenic beauty, such as national parks. Pictures may be obtained from railroad folders and government bulletins.

5. Establish a school museum. Collect industrial and other exhibits from the various sections of the United States, Canada, and the Latin countries. Make a cabinet in the manual-training department. Label and catalogue each exhibit.

6. Make individual geographies. Let each pupil make a binder in the art class. Develop the content as the work proceeds — mounting of pictures, drawing of charts, maps, graphs, and written descriptions relating to each problem studied.

7. Give pageants and dramas. Dramatize home life in Alaska, Chile, and Mexico. As a review, develop a pageant of western nations. Let a pupil representing each country dress according to native custom, and display pictures and exhibits of his country and explain its industries or scenic wonders.

8. Invite natives or travelers to come to the class and give personal experiences of life in neighboring states or countries. Illustrated slide or film lessons given by the teacher or outsiders always prove of great value to all the children.

9. Imaginary trips by means of charts and slides to the various national parks are also inspirational and instructive (see list of illustrative materials in Appendixes A and B).

IV. Continental Studies: Europe and Africa

Objectives. To gain the geographic information that will make possible a sympathetic understanding of the peoples of Europe and Africa.

Content. Europe and Africa.

History and geography should correlate perfectly here. It is at this point particularly that pupils eleven and twelve years of age are gaining a background for an understanding of the larger social, economic, and political problems which come in the later grades.

The chief purpose of the study of Europe is to learn about our European ancestors and the leading geographic factors that have influenced their progress. What ought Americans to know in order that they may intelligently appreciate the Italians, for instance, as a distinctive group of people? They are the ancestors of thousands of American citizens; as a nation, the United States has somewhat extensive political and commercial relations with Italy.

In the first place, American children should know something of the history of these people, their glorious past, and the centuries of struggle for existence. They should know that the Italian nation has made invaluable contributions to civilization, and should have sufficient knowledge of the rich racial traditions that have enabled these people to produce much of the finest art, literature, music, and governmental organization that the world possesses today. All this is needed as a background against which to visualize the achievements of the Italian people.

Stimulated by this information, keen interest is aroused to know more of the country of this romantic race. Rome, Venice, Naples, and Genoa are no longer dots on the map or mere commercial centers; they are reminders of wonderful days of adventure and intrigue (Fig. 102). They are scenes from the past where history was enacted by great statesmen and gorgeous medieval princelings. What were the geographic factors that helped to make these people such a powerful nation in bygone days? Why are they not now among the most influential people of the world? To solve such problems information is needed

regarding the surface, soil, climate, and nearness to bodies of water — factors which have controlled the activities of Italians all through their racial history.

The physical and climatic conditions of Italy have always been a handicap as well as an advantage to its people. During centuries of foreign rule, the physical

FIG. 102. The Rialto and Grand Canal, Venice

Rome, Venice, and Genoa are no longer dots on the map or mere commercial centers; pictures reveal them as reminders of wonderful days of adventure and intrigue

conditions have further tended to divide the Italians into more or less isolated groups, until even the language has split into some fifteen dialects. The semitropical climate of the south has wielded a great influence over the temperament of its people, making the characteristics and activities of the people of the north and those of the south vastly different. Italy is an old worn land; her soil has been made stale by bad farming; her hills were recklessly deforested centuries ago; the whole country is overpopu-

lated. Yet during the last few years Italy has made a wonderful effort to "come back" and assume her former proud position. Undoubtedly her success will be determined largely by her ability to overcome many of the geographic handicaps which are holding her back today.

Similarly, the history of every other group of people in Europe shows that the physical and climatic conditions have played a prominent part. To understand these people today, children must visit them by means of pictures and books, so that they will be able to place them in their proper perspective and background. There is a great variety of visual material available, and so there is little excuse for not providing a sufficient amount to make this grade work rich and interesting. Not only useful geographic pictures but also prints of masterpieces in painting, sculpture, and architecture, representative of each country, may be obtained. These may be used for incidental lessons of appreciation.

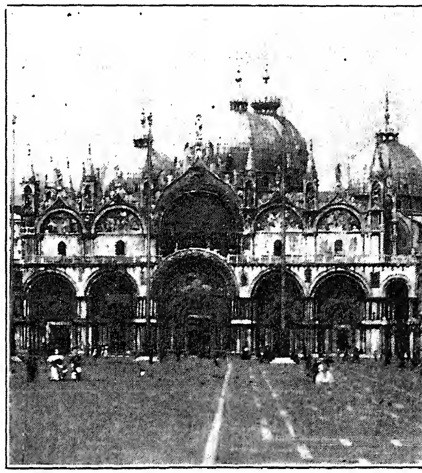

FIG. 103. Saint Mark's, Venice

A study of such works of art brings a keener appreciation of types of civilization of the past

Ten or fifteen minutes devoted occasionally to the study of reproductions of such works of art as Michelangelo's "Moses" or "David," Raphael's "Sistine Madonna," the beautiful mosaics of St. Mark's of Venice (see Fig. 103).

or the famous cathedral of Florence not only are of cultural value, but greatly help children to appreciate types of civilizations of the past or present.

Since Africa is largely controlled by European nations and her history is so closely linked with that of Europe, it seems logical to study the geography of Africa with that of the mother countries. It should be emphasized, however, that a progressive commonwealth is rapidly developing in South Africa, which seems destined to play an important part in the economic and political affairs of the other new powers now being developed south of the equator. (See Appendix for visual material.)

V. Continental Studies: Asia, Australia, and the Islands of the Pacific

Objectives. To acquire necessary geographic information and a sympathetic understanding of the peoples of the Pacific.

Content. Asia, Australia, New Zealand, East Indies, and the islands of the Pacific.

Because of the serious and difficult nature of the problems involved, it seems wise that this unit of subject matter should be deferred until children's minds are mature enough to grasp the significance of each problem as it is studied.

Leading geographers, sociologists, and experts in political economy agree that the great economic, social, and political problems of the world are gradually being shifted to the shores of the Pacific. Since the dawn of history, mankind, ever seeking new environment, has gradually migrated east and west from the cradle of civilization in southwestern Asia. At last there remain no more lands to discover, and today East meets West on the shores of the great Pacific Ocean.

The two races thus meeting are widely different — the Oriental, or yellow, and the Aryan, or white. Geographic environment and isolation have caused them to develop entirely different types of civilization. Yet they possess one powerful common interest, which has been made possible by modern means of transportation and communication penetrating even to the remotest sections. This common interest is commerce, or trade. It has brought enlightenment and prosperity to millions of people, but with it has also come a multiplicity of serious international problems, the like of which have never before been faced. Upon the solution of these problems to secure and maintain harmonious relations between divergent types of culture depend the future prosperity, progress, and even the continuance of civilization itself.

Two thirds of the human race is colored,[1] and one half of the world's population lives in Asia alone. During the last thirty years these millions of the Orient have been awakening from centuries of sleep. In this brief period Japan, with her seventy-seven millions, has emerged from an Oriental feudal system to become a great world power. China, with more than four hundred million people, still is considered the greatest latent power of the East. Her natural resources — coal, iron, oil — seem to be unlimited; yet her people are impoverished and undernourished. Although at present in a serious transitional period, she will sooner or later assume her responsibilities and become a great and wealthy power in this new empire of the Pacific.

These Oriental nations have kept themselves secluded from the outside world for so many centuries that it is

[1] "Colored" here refers to the nonwhite peoples. The total population of the world (1925) is about 1,700,000,000. Of these 555,000,000 are colored. The colored world is divided into four primary categories: yellow, 500,000,000; brown, 450,000,000; black, 150,000,000; red, 40,000,000. See Lothrop Stoddard's *The Rising Tide of Color*, p. 6. Charles Scribner's Sons.

not strange that little is known about them. Their civilization, their philosophy of life, their culture, is so vastly different from that of the Occidentals that it is difficult for each to understand the other. But because of the future that awaits both, especially on the Pacific coast, there is an urgent need that Occidentals study these people carefully and judge them by Eastern rather than by

FIG. 104. Sydney, Australia

A city of 900,000 population and one of the great ports of the new Pacific

Western standards and ideals. There is much that is fine and noble in their culture, art, literature, and philosophy. The three great Asiatic countries, Japan, China, and India, have much in common, but both Eastern and Western civilizations have reached the stage in the world's history where the East needs the West and the West needs the East. The great difference in mankind is not in the color of the skin but in the cultural status.

Within the last thirty years marvelous changes have taken place also in the Southern Hemisphere and in the

tropics. While many of our older European nations have been exhausting their vitality through strife and bad government, new and vigorous ones have been developing in South America, Australia, New Zealand, and South Africa. In a few short years Australia and New Zealand have developed from small colonies to great commonwealths with about seven millions of prosperous people. It has been estimated that Australia alone could comfortably support fully two or three hundred millions. All these commonwealths are in the favored temperate belts and enjoy all the geographic conditions which are necessary for growth and prosperity. Together they are already rated as one of the five leading centers of civilization. In the tropical islands the white man has been experimenting with marked success. Great plantations producing millions of dollars' worth of tropical products have been developed and financed by the white man's capital, and are operated under his management. Exports from the Pacific Islands to the United States, particularly from the Hawaiian and Philippine islands, are increasing rapidly.

FIG. 105. Looking up King Street, Sydney
One of the many streets which remind one of an American city

The wealth of the resources and the unlimited possibilities of islands and other lands that border on the great Pacific will continue to lure thousands of the most fit from the overcrowded weakened nations of the Old World. Many scientists predict that within the next century the greater part of the world's trade will shift from the Atlantic to this great Pacific. Without a doubt many boys and girls of today will live to see and probably will help to build great empires on the rim of the Pacific. A brief study of the rapid growth in population and business of the fourteen most important seaports of the east and west sides of the Pacific is required to make possible a reasonable prediction of what the status may be a hundred years hence. California alone has gained over one million, three hundred thousand newcomers in the four years 1923–1927, an increase of over eight hundred and twenty immigrants a day; and these figures grow larger each year.

Today the United States and Japan dominate the trade of the Pacific, and their interests are bound together. For the good of all concerned they must work coöperatively and harmoniously. This extensive intercommunication of two vastly different races has opened up new social, economic, and political problems that must be solved coöperatively. America and Japan must therefore make a more serious effort to understand and appreciate each other.

The geography of the Orient and the Pacific has been treated with indifference entirely too long for the good of the world. Vital racial problems that probably could have been avoided are the result. We Americans have been grossly misrepresented to the Orientals, and they have been misrepresented to us. Our textbooks and storybooks have been filled with tales of the outlandish customs, traditions, and impoverished lives of the ignorant coolies of China, but we have heard very little about the beautiful

FIG. 106. A street in Kobe
A glimpse of old Japan

FIG. 107. A modern city of Japan
Courtesy of the Nippon Yusen Kaisha Steamship Company, San Francisco

homes and gardens (see Fig. 108), the art treasures, or the customs of the intellectual class. Returning missionaries and travelers have been prone to dwell upon peculiarities and evils, to the exclusion of all else. In order to be fair we must see both sides. We must study with open minds the social life of the rich and poor of the country and city, and become acquainted with the geographic conditions

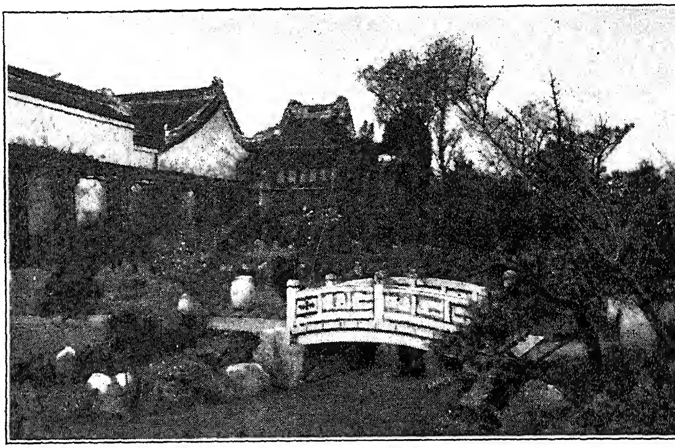

FIG. 108. A Chinese house
Here are found beauty, comfort, and enjoyment

that have more or less controlled all their activities. Students must be led to travel in imagination to these foreign peoples and study them sympathetically in their own environment. Every lesson must be enriched and explained by good pictures, exhibits, and physical maps. The motion-picture film is of vital importance in revealing true living conditions and picturizing great stretches of country at one time. Americans cannot understand Oriental books and get the Oriental point of view, nor can the people of the Orient read our books to any great ex-

tent; but all alike can read the message of pictures. This medium of conveying correct impressions offers invaluable help in solving our international problems.

Students in many parts of the United States have lacked opportunity to meet and converse with Orientals of the cultured class. It is therefore a great help if Japanese, Chinese, Hindu, or Filipino students can be persuaded to speak before our classes. The whole attitude of a class has been completely changed after students have had an opportunity to converse with an intelligent Filipino or Chinese. It is often a revelation to find that these native Orientals look much like the average dark Americans, and that they also talk and act much as we do.

SUGGESTIVE PROBLEMS

1. Why is the progress of the Far East so important to us?
2. Why is the Japanese Empire the only *world power* in Asia?
3. Compare the British Isles with Japan as to location, area, surface, climate, population, etc. What great advantages has England over Japan? What seems to be Japan's greatest problem?
4. Why has China been so slow in learning to use the machinery, the tools, and the methods which have brought prosperity and power to the Western world?
5. Why do four-fifths of the people of Asia live in the southeastern part? How does this crowded condition affect them? What is the relation of density of population to rivers?
6. China has untold wealth in mineral resources; yet it is not a manufacturing country. Why?
7. Compare the railroads and other transportation facilities of the Orient with those of the United States.
8. Which river is of more service to mankind, Hwang or Nile? Compare both with the Mississippi.
9. Compare farming and irrigation systems of China and United States.
10. Compare the natural advantages for progress in the United States and in China. Suppose the two countries were to exchange

their entire populations in a body. What changes might take place in China as a result? in the United States?

11. What can the American educational motion picture teach the people of the Orient today?

Pictures, exhibits, maps, and globes are necessary in order to develop each of the above problems. Teachers can obtain valuable visual material from the magazines *Asia* and *Japan* and from the Pacific steamship folders, such as are issued by the Dollar Steamship Company, San Francisco, the Nippon Yusen Kaisha Steamship Company, San Francisco, Pacific Mail Steamship Company of San Francisco, Matson Navigation Line, San Francisco, and Burns, Philips & Co., Sydney, Australia. For other visual aids, see classified list in Appendix B.

VI. Social-Science Problems for the Upper Grades

Objectives. To acquire a background for understanding the more important social, political, and economic problems of everyday life.

Content. Problems showing how man, through his intellect, has overcome the handicaps of nature, improved his environment, and harnessed natural resources and forces better to serve his needs.

The subject matter that will meet the needs of these objectives involves history, geography, and civics. The problems must therefore be considered as units, apart from any formal classification; they cannot be properly grouped under either geography, history or civics.[1]

In the preceding grades children have been concerned with people and with geographic principles that control

[1] Junior-high-school teachers will find the series "Textbooks in Social Sciences" (Ginn and Company), by Dr. Harold Rugg and his co-workers of the Lincoln School, Teachers College, Columbia University, of invaluable help in dealing with social, economic, and political problems.

life all over the world. They have acquired a fund of geographic knowledge and historical relationships, and are ready to apply that knowledge to concrete problems that concern life. These problems in order to be appreciated and understood, however, must appeal to the native interests and needs of boys and girls of this adolescent age. The various topics must be treated rather in detail, including inspirational descriptions, episodes of human interest, and a vast amount of illustrative materials. Ample opportunities must be provided for working out projects, making charts, maps, graphs, and collecting suitable pictures. The type of procedure followed with these older students should be varied and should offer abundant opportunity for individual research and self-expression. Illustrated slide lessons, informal discussions, and the more formal debate should be made use of freely. It is in such activities that latent abilities are discovered and developed.

Problems that might be taken up in these upper grades deal largely with current living, and therefore involve a more or less careful study of current events. Current events the world over are closely related to geographic conditions and relationships. Their study carries pupils to every corner of the globe, to far-off Brazil, China, Morocco, or Poland. For example, in order fully to understand the significance of the Morocco affair in 1926, students must first acquaint themselves with the Riffians as a people and with their geographic environment. This acquaintance must be rather intimate, and can be gained only through a careful study of maps and inspirational descriptions coupled with good pictures which bring students into the very presence of the situation. Nothing equals the motion picture for interpreting truth in a vivid manner.

Every classroom should also have a large bulletin board for the display of pictures and maps pertaining to such current topics as the recent air achievements. The development of transcontinental air-mail service, Byrd's sensational round-trip flight from Spitzbergen to the North Pole in sixteen hours' time, the Amundsen-Ellsworth successful

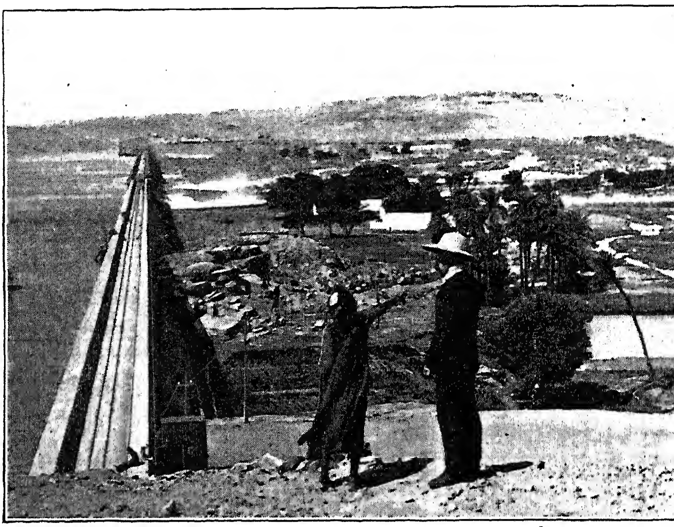

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FIG. 109. The Aswan Dam, Egypt

Modern irrigation on the Nile River

trip in the *Norge*, Lindbergh's epoch-making transatlantic exploit, in which he flew 3610 miles in 33 hours and 30 minutes, and the more recent air flight between Oakland (California), Honolulu, Fiji, and Australia, which was the first air flight across the Pacific, involve problems of man's struggle to find better transportation facilities for economic and commercial purposes. These events are stepping-stones in history. They are concerned with the

invention and evolution of aircraft, the study of the source of supply of materials used for construction, and the planning of geographic routes of travel. Vivid pictures of the types of aircraft used, of the air heroes who are pioneering the way, and of the routes of travel explain these problems concretely to the students.

© Publishers' Photo Service

FIG. 110. The ancient *shaduf*, still used along the banks of the Nile

The water bucket is balanced by a counterweight of mud

A clear picture of the Aswan Dam of Egypt or the Roosevelt Dam of Arizona[1] and a panoramic view of the fertile field in the great valley below tell a vivid story of the way in which man has overcome the handicaps of nature. He has controlled water power, distributing it over the land at his will, and thus has turned barren deserts into luxuriant gardens (see Figs. 84 and 85). Other pictures showing the primitive mode of irrigation by means of the crude *shaduf* of the Egyptian or the human water wheel of the Chinese tell vivid stories of man's progress in various

[1] For an excellent picture and map of the Roosevelt Dam see "The Apache Trail," a Southern Pacific railroad folder.

parts of the world. These also bring up the other problem of why these ancient peoples, who had attained a high state of civilization several thousands of years before our European ancestors had emerged from semibarbarism, are still using the primitive methods of past ages (see Fig. 111).

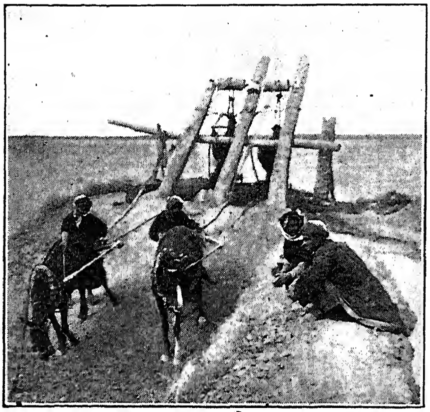

FIG. 111. Irrigation on the Tigris River
The primitive methods of past ages are still in use today

Pictures showing great stretches of mountainous country which have been made desolate and barren by the ravages of a forest fire make a deep impression and emphasize the need of conserving our forests by watchfulness and care (see Figs. 114 and 115).

Other pictures may be used showing the bare hills of China and their effect on the country. These may stimulate an interest in the study of ways and means of reforesting America's denuded forest areas.

SUGGESTIVE PROBLEMS FOR UPPER GRADES

I. Transportation in relation to man and his work.[1]
   1. Evolution of travel by water from the primitive log raft and dugout canoe to the modern motor-driven ocean vessel. This problem involves the use of pictures of important models and of their inventors; every episode possible containing human interest regarding the struggle to

[1] See list of visual materials in Appendix.

achieve success should be introduced in each topic studied. (See Fig. 112.)

a. Great trade routes of past and present.
Natural routes, such as oceans and rivers.
Canals. Grand Canal of China, Suez, Erie, Panama, Kiel, Manchester, Berlin-Stettin, Marseille, and many others.

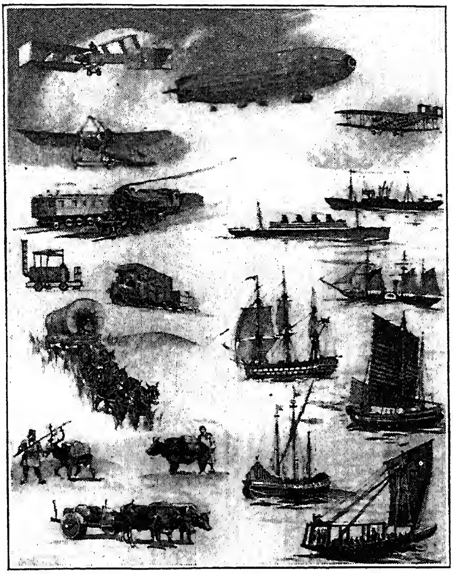

FIG. 112. The evolution of transportation
Courtesy of Compton's *Pictured Encyclopedia*

2. Evolution of transportation by land — from pack horse to modern train and automobile (see list of motion pictures in Appendix B).
   a. Railroad routes and highways — maps, charts.
   Great bridges, tunnels, subways, and tubes of the world. Pictures of each.
3. Evolution of transportation by air — from the very earliest attempts to fly to recent developments in aëronautics (see motion pictures in Appendix B).

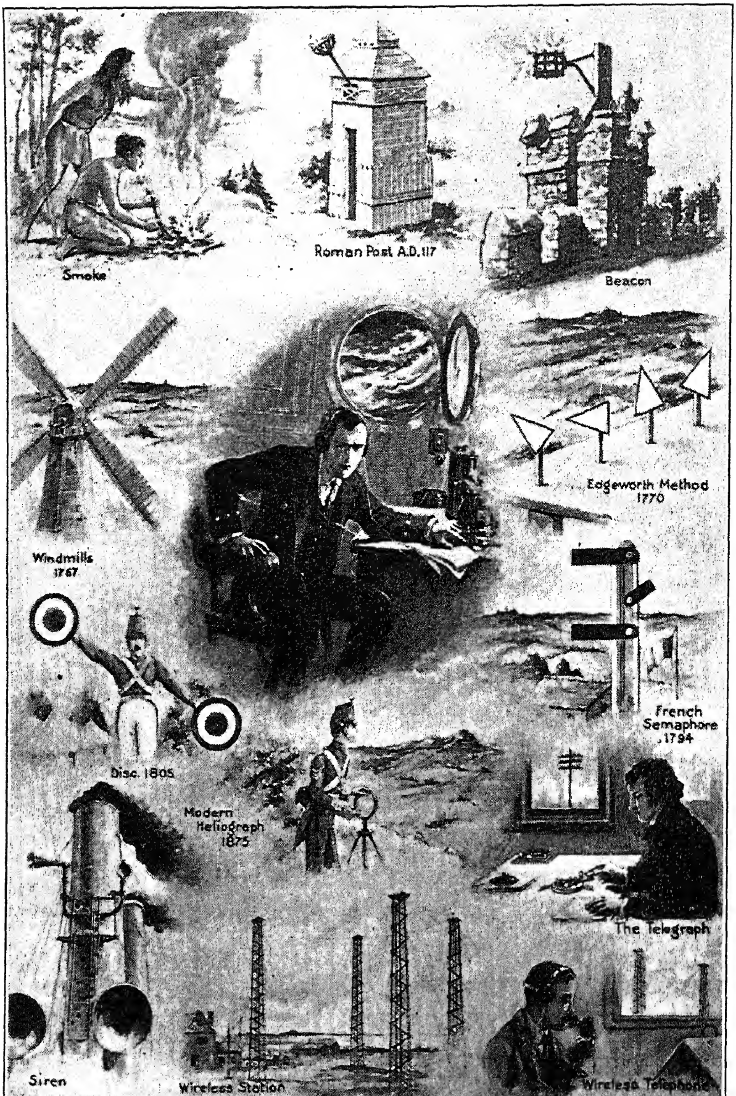

FIG. 113. The story of talking through space
Courtesy of Compton's *Pictured Encyclopedia*

II. Problems related to communication.
1. Evolution of writing and printing.
2. History of United States Mail Service.
3. Electricity, a great gift of the age (see Fig. 119).
4. Telephone and telegraph.
5. Wireless and radio.
6. Motion pictures.

FIG. 114. A typical virgin forest in Washington before a fire

Photograph by the United States Forest Service

FIG. 115. A forest after a fire

Photograph by the United States Forest Service

III. Other industrial improvements of factory and farm involving the history of the Industrial Revolution.
1. James Watt and the steam engine.
2. Crompton, Arkwright, and Cartwright and the weaving industry — wool and cotton.
3. Eli Whitney and the cotton gin. The cotton industry.
4. Howe and the sewing machine.

5. McCormick and the reaper. The grain industry.
6. Coal, iron, and oil in modern industry.

IV. Conservation of land, water, and natural resources.
1. Reclamation projects — Holland; Everglades of Florida; irrigation of arid lands in Western states (see Figs. 84, 85).
2. Conservation of forests, fish, game, and minerals (see government bulletins).

V. Growth of cities.
1. How and why great ports came to be. Show pictures of New York in 1800 and today, and Chicago or San Francisco in 1850 and today. What are the geographic conditions that made their growth possible?
2. How and why great industrial centers developed. Pictures of Detroit as a small village and as the center of the automobile industry today will arouse interest in this problem.

Many other important problems dealing with immigration, labor, business, and politics which come up in high-school work can be made far more interesting and understandable if pupils can visualize their problems.

HISTORY AND CIVICS

Scope and importance of history. History is the story of the struggle of the human race for existence; it is the story of man's conquests and achievements as he has endeavored to adjust himself to his social and geographic environment.

Geography and history, comprehensively considered, involve the total racial experience of mankind. It has been said that geography describes the physical setting and is the stage, so to speak, on which the drama of life (history) is being enacted. History deals with the experiences and activities of man, while geographic conditions largely control and regulate such activities. One

enriches and interprets the other, and so they must be treated more or less as interdependent subjects which explain the problems of life. Geography precedes, however; for before the experiences and activities of man can be explained and understood the great geographic factors that control those human activities must be understood.

One of the greatest values of the study of history is the development of an appreciation of the social forces operating in human life. Of these social forces, the two chief influences upon the progress and achievements of groups of people are inherited ability and environmental influences. The American Indian did not arrive at a high state of civilization, although he lived under the same rich geographic conditions that the American colonists found. The colonists came endowed with a rich racial heritage which guided them in meeting new situations, in adjusting themselves to and in improving their new geographic environment. Therefore a knowledge of the achievements, traditions, problems, and ideals of the past may act as a source of inspiration, to help those who hold the future destiny of American democracy in their hands, to enrich their lives, and to make them more efficient citizens.

Aim in teaching history. History is concerned with the concrete experiences of different groups of peoples amid diverse surroundings. It is filled with dramatic events, in which man has suffered and fought for great ideals and has finally triumphed over difficulties and risen to ever higher levels of culture. History reveals a long continued story of slow progress from primitive times. Within that stretch of time there are great events which are important stepping-stones in humanity's upward climb. A concrete knowledge of the causes and effects of those events should help any individual to understand life better and to appreciate the social institutions that he now enjoys.

What our civilization will be a few years hence depends largely on the ideals, attitudes, and appreciations that are developed in the boys and girls of today. Citizens of every age have studied the history of the past for precepts and examples in organizing and maintaining social institutions. They have endeavored to avoid the errors and to profit by the constructive achievements. We are greatly indebted to our ancestors for what we are and for what we enjoy today. Our chief *aim* in teaching history, then, is to develop an appreciative understanding of the social structure and its inter-relationships.

Need of visual instruction in teaching history. In the teaching of history, as well as of geography, teachers must work with nature and meet the needs and interests of boys and girls. The memorizing of facts, dates, and names is meaningless; children are interested only in life and activities. History is rich in adventure, dramatic action, and heroic conquest. It does indeed deal with facts, but the facts express the causes and effects of human experiences that took place at certain definite places; therefore the scene and event *together* must be revivified as a present living experience.

History more than any other subject, perhaps, must appeal to the emotional as well as to the intellectual faculties. Both old and young must see and feel human experiences in order fully to appreciate and understand their significance. The events that took place during the Revolutionary War are usually uninteresting and meaningless to boys and girls, but actually to see General Washington and his brave soldiers suffering during that terrible winter at Valley Forge makes a deep and lasting impression on any mind. Questions naturally come up concerning the cause of such suffering and endurance and the effect on the development of our national history.

History then must be vitalized through visualization. History students of all ages need a wealth of concrete descriptions, episodes, and narrations of original personal experiences made to live today in vivid pictures of historical persons, places, and activities.

Because history is dynamic, romantic, and full of color, the motion picture promises to render a greater service

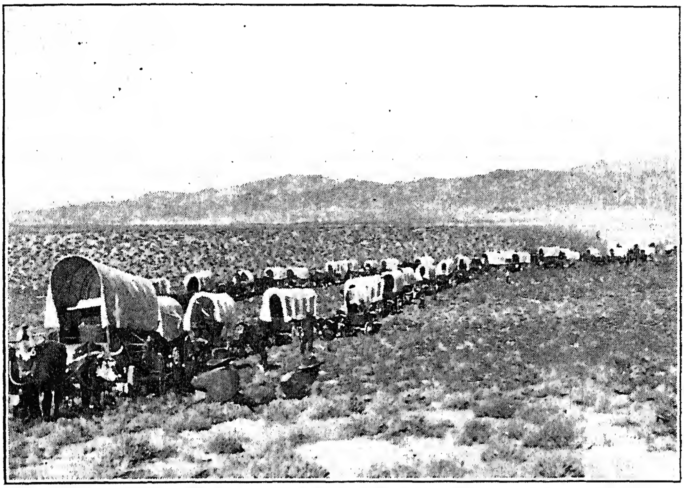

FIG. 116. A scene from the motion picture "The Covered Wagon"

in the teaching of this subject than any other visual means. As photography is comparatively a new art, it has always been a difficult thing to obtain suitable pictures with which to enrich history teaching. But the magic motion picture has overcome every handicap of time and space, and re-creates every activity of ancient or modern history almost as accurately as the original happening.

To study with undivided attention parts of such a film as "The Covered Wagon," to live mentally with those

early pioneers crossing barren plains and rough mountains in their cumbersome vehicles, to witness their courage in fording dangerous streams and in repelling the frequent attacks of scalp-seeking Indians as they forced their way onward seeking new homes in the West, certainly reveals more true information and leaves deeper impressions regarding westward migration than any printed page can give (Fig. 116).

The motion-picture film is destined to play a most important part in the future teaching of history. It is the only visual aid that has the power to portray truthfully the activities and processes of which all history is composed.

To meet the needs of pupils of different abilities the following distribution of subject matter is suggested.

I. Primitive Peoples

Objective. To develop a keen appreciation of how and why primitive man lived as he did. To develop a foundation for appreciating the home environment by constantly contrasting primitive life and its many hardships with modern civilized life and its many advantages.

Content. Primitive peoples, the tree-dwellers, the cave-dwellers, American Indians. National holidays as they occur during the year.

In taking up primitive life in the primary grades, we are not only satisfying the needs and interests of these young children, but are offering unlimited opportunities for interesting activities in which children may acquire those right habits, attitudes, and appreciations that should be developed very early in life. They learn how people live in social groups; how some human beings have struggled for existence; how others have overcome handicaps, prospered, and attained a higher stage of living.

By the time children have reached the second grade they have acquired considerable reading ability and a genuine interest in books and stories. The subject matter suggested above offers rich opportunities for fascinating and purposeful reading.

These little children, with limited experiences, are endeavoring to understand activities and conditions of a strange world in the far distant past; it is therefore quite evident that every new step and each new idea must be visualized very concretely. Although the storybooks used are highly illustrated, the pictures are very small. They should be enlarged on posters or made into stereopticon slides.

Pictures of prehistoric animals, the cave man, his home and tools, can all be enlarged from flat pictures.

In the primary grades more than in any succeeding grade historical settings and activities must be re-created and relived through dramatization, sand-table projects, and pictures, in order to bring correct impressions and appreciations.

By being transported, through realistic pictures, into the very presence of the simple home life of the Indian, children acquire a concrete basis for contrasting the crude tepee home, its furnishings, the means of preparing a meal, and so on, with the comforts and luxuries which they enjoy in their own homes. Interest stimulated through these pictorial experiences creates a desire to imitate and live like these primitive peoples, and dramatic activities are the natural result. The children seek materials of some sort with which they can make a real Indian tepee; they want to dress like Indians, to make bows and arrows, crude tools, and pottery.

Every step presents new problems to be solved before satisfaction can be achieved. How did the Indians fasten the poles that supported the tepee? How did they make

their simple garments of skins and furs and their picturesque pottery? Only by studying vivid pictures in correlation with the descriptive text can these problems be solved truthfully.

In order that young children may understand and appreciate the significance of national holidays, these, too, must be interpreted and given meaning through pictures and interesting episodes. To see Washington at his home in Mount Vernon, or Columbus landing on the shores of the New World, removes these great heroes from the realm of the legend and myth and reveals them as real human beings.

Available visual material. Flat pictures of prehistoric men and animals,[1] of Indians, and of Columbus, the Pilgrims, Washington, and Lincoln may be used. Stereographs and stereopticon slides of Indians are also available. (See Appendix for lists of materials and sources of supply.)

Illustrated Books

DEARBORN. *How the Indians Lived.* Ginn and Company.
DOPP. *The Tree Dwellers.* Rand McNally & Company.
DOPP. *Early Cave Men.* Rand McNally & Company.
DOPP. *Later Cave Men.* Rand McNally & Company.
DOPP. *Early Sea Peoples.* Rand McNally & Company.
PERKINS. *The Cave Twins.* Houghton Mifflin Company.
STARR. *American Indians.* D. C. Heath & Co.

II. LOCAL AND STATE HISTORY

Objective. To acquire an appreciative interest in local and state history as a stepping-stone to American and world history.

Content. History of home, community, and state.

By the time children have reached the fourth grade, they have learned a good deal about remote primitive

[1] See the following numbers of *National Geographic Magazine* for pictures of prehistoric man and animals: February, 1916; May, 1919. For pictures of Indians see April, 1916; October, 1921; May, 1916.

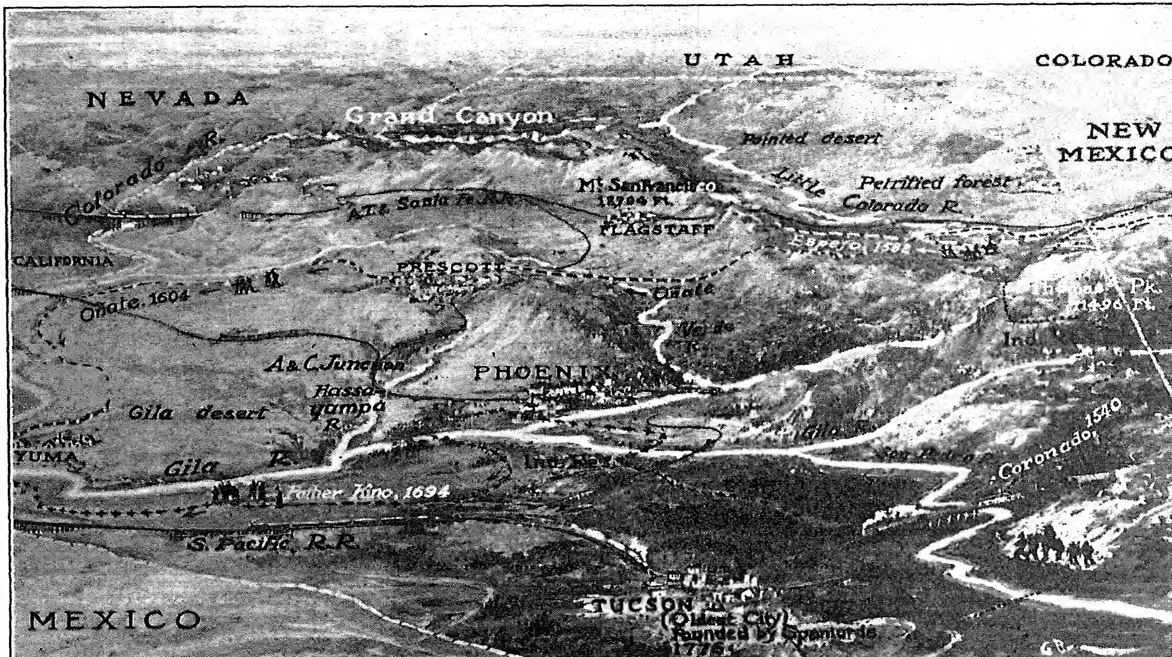

FIG. 117. A graphic picture of the history and geography of Arizona
Courtesy of Compton's *Pictured Encyclopedia*

peoples, and are now ready to understand and appreciate the interesting historical events which directly contributed to the development of the small center of civilization of which they are a part.

Every community, however small or remote, has its own interesting romantic history. It has its unique heroes and traditions which its citizens wish to perpetuate. Some were old fur-trading posts, mining camps, mission centers, Indian villages, or Western forts of defense. Such subject matter makes interesting reading for children of this age, and they gain their first idea of the significance of history in relation to present-day progress.

Material for historical study may be found in all communities. The first Spanish settlement at Saint Augustine offers the ruins of its massive fortifications as silent reminders of struggles and achievements of former days. On the other hand, even in the modern trade centers of the Middle West, which have sprung up like magic within a few years, teachers may find a wealth of material with which to begin the study of local history. For instance, the story of the city of Detroit from 1701, when it was established as a French trading post, to its present position as the automobile center of the world, supplies enough interesting subject matter to keep the children of Detroit fascinated for many weeks.

Equipped with this strictly local phase of history, children are better prepared to appreciate the larger unit of history — namely, their individual states. It is to be remembered at this point that, as children are led further away from their circumscribed home environment, where they cannot visit relics and localities, the need for introducing all types of visual aids and re-creating situations and reënacting events through dramatization becomes more imperative.

Visualizing the history and geography of a state. As a result of a preliminary discussion as to how the group should proceed in taking up the history and geography of California, a fourth-grade class decided that they would construct a large floor map on which they might visualize their history and geography lessons as they proceeded. Specific work was delegated to various members of the

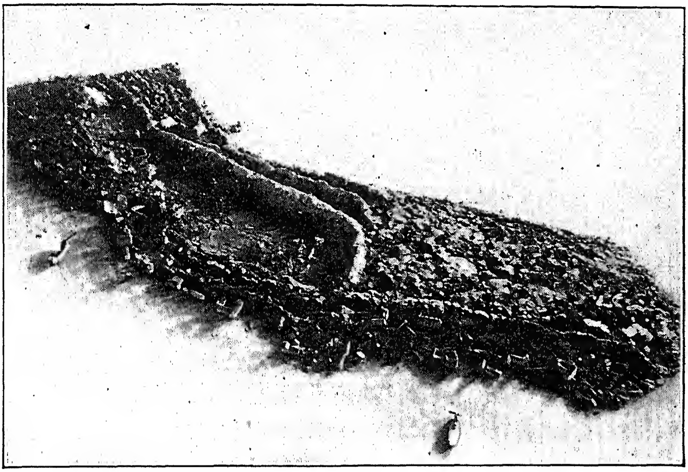

FIG. 118. A floor map of California
A fourth-grade project

group. Some chose to make individual maps on large pieces of wrapping paper while the others were constructing the larger floor map (Fig. 118).

After a few preliminary arithmetic lessons relative to drawing maps to scale, two boys measured off a large outline map twelve feet long. Rivers, lakes, and mountain ranges were chalked off. Upon this foundation was molded a most realistic relief map of California. An adobe clay soil found in the vicinity was used for this

work. The two highest peaks of the Sierras, Mount Shasta and Mount Whitney, were blanketed in perpetual snow made from a combination of salt, water, and flour, and the forest belts were portrayed by means of representative twigs. The blue Pacific, the great rivers, and the lakes were colored with blue crayon. The low valleys were left on the level of the floor and colored green. The borax of the southern deserts was indicated by salt scattered about, and the picturesque cactus was made of sage-green modeline.

This large model of the state of California revealed the geographic conditions and relationships before the coming of the white man, and with this realistic picture of their state ever before them, the pupils traced its gradual historical and geographical development. As they studied the early exploration period, they traced Cabrillo's route to Upper California in 1542; then a miniature *Golden Hind* was built, and Sir Francis Drake's voyage was traced along the coast to the little harbor of Drake's Bay. In the same manner the mission history was taken up. First, the reasons for the founding of the missions were developed, and, as each mission was taken up, the geographic reasons for its location were carefully studied. Pictures were collected and studied, and a miniature model of each mission was carved out of white soap, with the tiled roof painted red. By vote of the class, the best-carved mission was chosen and placed in its proper place on the floor map. The whole surroundings of the mission were then developed. Grapevines, olives, grain, and palms were planted as history records. As time went on, the valleys were cultivated; great fruit orchards and grainfields appeared; and cattle and sheep, made of modeline, were placed on the open ranges.

While studying the period of the discovery of gold, Sutter's Fort and Sutter's mill were constructed and placed

in their historic location. Then immigrants began to come in the old prairie schooner and by boat around the Horn. The pony express route was visualized in its proper setting; the Union Pacific Railroad appeared in 1869; small trading centers grew into cities. As the industries began to develop more extensively, the great map began to assume the appearance of California of today.

At every step in this procedure flat pictures, and particularly slides, were used effectively during the recitation periods. The project occupied the major part of one semester. The whole study culminated in a pageant at the end of the semester in which every child in the group took part.

The history of any state may be worked up in similar manner. Not many schools have adequate space for an effective floor map, but any class may use long sheets of wrapping paper or a long blackboard on which may be visualized the important historical events. Such projects may also be worked out in the school yard if space is available.

While the class was studying the history of California, many minor projects were developed on small sand tables, such as early Indian life, a Spanish pueblo, a mining camp of 1849, Sutter's Fort, Monterey as the first capital of the state, and the development of the Imperial Valley as a result of irrigation.

In order to supply the needs of these fourth-grade children, who were constantly searching for visual materials to solve their problems, the parents and others outside the school became interested in their specific problems, and spent much time visiting libraries, historical societies, and museums, where the materials they needed might be found. Several families also devoted week-ends to visiting places of historical importance, and as they walked, with a common interest, through the old corridors of the mission San Juan Bautista or wandered through

the various rooms of Fort Sutter at Sacramento, examining old stagecoaches, covered wagons, and ancient documents, parent and child relived the past history of their state. The children returned to the classroom fired with new interest, and with the aid of their new pictures led the whole class to relive the week-end experience. The original data gained through these week-end excursions corrected many erroneous ideas and greatly aided the children in carrying on their projects.

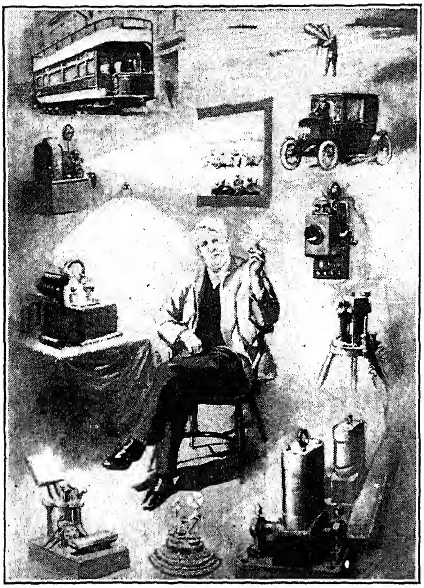

FIG. 119. Edison, a great benefactor of humanity

Courtesy of Compton's *Pictured Encyclopedia*

III. Great Benefactors of our Nation

Objective. To furnish a basis for understanding and appreciating how the American democracy has been developed largely through the influence of men and women of remarkable personalities with high ideals for service.

Content. A few important historical events involving the study of great benefactors of our nation.

At this mental age children are, to a great extent, hero-worshipers, and seem to be greatly interested in reading true stories about leaders, heroes, and inventors with their wonderful achievements. The stories of the struggles of

Columbus, who endeavored from early manhood until the time of his tragic death to achieve a definite goal, or the life history of poor boys like Lincoln or Edison (Fig. 119), who became great benefactors of humanity, furnish interesting and stimulating reading; also the lessons involved make lasting impressions on these young minds.

FIG. 120. Columbus pleading his cause before Queen Isabella

From "Columbus," one of the *Chronicles of America Photoplays*

In order that all mythical illusions may be eradicated and that these great personalities may become human, like men and women of today, portraits of these individuals, together with pictures of historical events or achievements with which they were associated, must be introduced. To see a picture of Columbus pleading his cause before the court of Queen Isabella (Fig. 120) and again to see him in mid-ocean, trying to quell a mutiny among his sailors, who are determined to turn back to Spain, im-

presses one with a certain sense of truth and reality which might not be gained from the printed page. Again, the display of pictures of a dugout log canoe, of Fulton's first steamboat on the Hudson River, and of a great ocean liner of today may greatly deepen the appreciation for the contribution that Robert Fulton made to the world.

Through such a concrete study children may get a bird's-eye view of the development of our nation.

IV. An Outline of World History

Objective. To develop an appreciation of how the present came from the past, thus acquiring a basis for understanding the present civilization.

Content. General acquaintance with the civilization, and with the great personalities and their achievements, of the ancient peoples of the Tigris and Euphrates, Egypt, Persia, Palestine, Syria, with particular emphasis on the achievements of the early Greeks, Romans, Teutons, and English.

The knowledge, attitudes, and appreciations gained during this period (when the general history and a more detailed study of the geography of Europe are taken up) really form the basis for understanding the more comprehensive history of the American democracy which usually follows in the next step.

Americans are a complex people. Forces and influences which have molded their character have been slowly growing through many centuries. They have inherited from peoples all over the world, but are particularly indebted to European ancestors. Here the school has a most excellent opportunity to reëmphasize the interdependence of nations and peoples, and the serious need of unselfish coöperation for the sake of civilization and the uplifting of humanity in general.

In studying this background of American history, children are given their first opportunity to appreciate the fact that American history is only a part of that great history of civilization which began thousands of years ago. By tracing the evolution of civilization up to the present, pupils may be led to understand better their responsibility for improving this inheritance. A general knowledge of the important contributions made by centers of civilization in the past ages — in science and invention, in freedom of

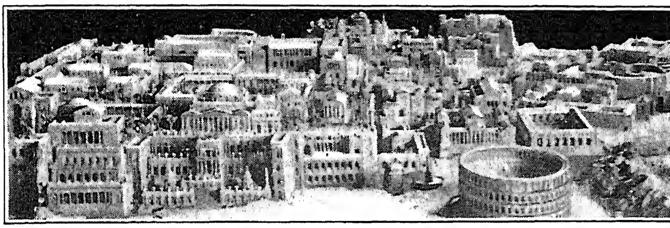

FIG. 121. A restoration of Imperial Rome

Such a picture removes ancient Rome from the realm of legendary history. (Courtesy of Compton's *Pictured Encyclopedia*)

religion and in government, and in the advancement of art and literature — ought to make individuals more tolerant and grateful for what others have done for them.

The great difficulty with this phase of history is its seeming remoteness, which so closely links it to the unreal and legendary. The teacher's problem, then, is to recreate and revivify. As Emerson says:[1]

> We, as we read, must become Greeks, Romans, Turks, priest and king, martyr and executioner; must fasten these images to some reality in our secret experience, or we shall learn nothing rightly. . . . The student is to read history actively and not passively; to esteem his own life the text, and books the commentary.

[1] Ralph Waldo Emerson, "History," in *Essays* (First Series). Houghton Mifflin Company.

To explain the text with realistic photographs of the ruins of the great palace of Nebuchadnezzar, of ancient Nineveh, of the Parthenon of Athens, of the unsurpassed Roman acqueducts, roads, and churches, tends to give concrete evidence of real achievements. To reënact the procedure carried on in a Roman Senate or the signing of

FIG. 122. Rome today

the Magna Charta necessitates real study and leaves a definite impression on the minds of all who participate.

A visualized lesson on Greece in a sixth grade. What did ancient Greece contribute to the world? This problem included the study of ancient Greek life, religion, art, government, and the great personalities that helped to develop Greek civilization.

The class decided to make a small Greek theater in which the interesting events of Greek history might be enacted. The boys built a most attractive Greek stage,

the front of which was modeled after the front face of the Parthenon. This involved rather a close study of the Parthenon and its style of architecture. A group of girls made an appropriate stage curtain.

As the early Greek mythology was studied, each mythical character was represented by means of drawing, painting, and cutting out representative figures from heavy cardboard. These cardboard figures wore either painted or cloth costumes.

As a final review, each section of study was dramatized in the little theater. The boys arranged a long sliding board in the floor of the front part of the stage, which was operated from both sides. In the top of the board was a small groove which held the little figures. When the curtains were drawn back, the Greek characters, with all their symbols and paraphernalia, glided across the stage in great dignity. Different pupils related the whole story of the part each character played in Greek history, much in the manner of a puppet entertainment. In the same way the lives and activities of the great Greek statesmen, philosophers, poets, and artists were reënacted.

At the end of the semester a general review took the form of a pageant. For this event each pupil selected the Greek character that he wished to impersonate, studied the life in detail, planned the costume, and organized an original speech. At this final performance each pupil, dressed true to character, came out by the side of the stage and gave a speech just as the miniature representative figure glided into view and was illuminated by means of small footlights in the Greek stage.

All through the development of these lessons the children lived in a picture world, trying to revivify the past. They did not read books less, but very much more, as a result of studying so many pictures of every description.

Small pictures in books were often thrown on the screen for group discussion, and slides and stereographs were used extensively. The old Underwood & Underwood set of stereographs on Greece was found to be very helpful in the study of Athens.

V. History of United States

Objective. To acquire an appreciative understanding of American social and political institutions and how they were developed.

Content. Important events in the development of our nation, with emphasis on the causes and effects.

The history of the United States is usually taken up in the seventh and eighth grades, and is closely correlated with geography and civics. In fact, at this point the three subjects are inseparable. Here, as in the preceding grades, concrete details, episodes, narratives, pictures, cartoons, and graphic charts are the teacher's essential aids.

Study of United States history might well be centered about a few large units or problems that fundamentally affect the national life. This plan affords greater opportunity for detailed study of a few outstanding matters, and gives ample time to trace their beginnings and interrelationships. Such problems as industrial development and immigration must be traced far back to their European origin.

The study of history in general frequently fails in its purpose because it is so often nothing more than verbal memory work. In some way it must be endowed with pulsing life, that it may impress itself upon the children as being vital. Make more use of the dramatic instinct; allow the children to become actors in history. This always appeals to them and insures a keener interest.

The motion picture, however, seems destined to be of greatest service in the teaching of any phase of history. Its power to portray the past accurately and effectively has at present no equal. Little has been accomplished in this line thus far, but sketches of American history as portrayed in "The Covered Wagon," "The Iron Horse,"

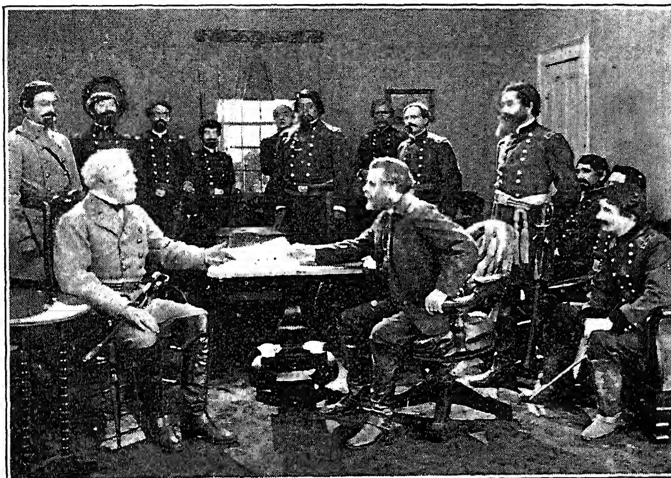

FIG. 123. Grant and Lee at Appomattox Court House

On April 9, 1865, in the presence of his staff and other Federal officers, Grant presented to Lee the terms of the surrender of the Army of Northern Virginia. (From "Dixie," one of the *Chronicles of America Photoplays*)

"America," and Rockett's "Abraham Lincoln" clearly reveal possibilities and indicate what the future promises.

A very noteworthy piece of educational work has been accomplished in the *Chronicles of America Photoplays* produced by the Yale University Press. Teachers have waited long for such films, and their practical use may be begun very effectively in this grade and continued throughout the high school. They are not designed, however, for

children below the seventh grade, as it is necessary that pupils have a broad knowledge of United States history in order to comprehend the significance of the activities portrayed. These pictures are particularly excellent for high-school students who are using the *Chronicles of America* as textbooks.

Whenever it is possible, each film should be presented twice—once as a preview to stimulate interest in a new problem, and again after extensive study and research has been carried on.

SUGGESTIVE PROBLEMS AND PROJECTS

1. How did the Old World come to find the New?
   a. Make large wall map on heavy wrapping paper of the world or the Atlantic Ocean and of countries bordering on its shores. Using this as a basis for study, trace with colored crayon the routes followed by Columbus, Balboa, Magellan, and the other discoverers and explorers. Place names and dates on colored lines.
   b. Study the film "Columbus" from the *Chronicles of America Photoplays*.[1] Dramatize the life of Columbus.
2. Why did the English colonists come to America to live?
   a. Make a large wall map of eastern shores of the United States, coloring lightly the areas occupied by various colonies.
   b. Dramatize such events as the landing of the Pilgrims, early colonial life, the courtship of Miles Standish, William Penn and the Indians, a town meeting, and the first representative assembly.
   c. Study the films "Jamestown," "The Pilgrims," and "The Puritans"[1] from the *Chronicles of America Photoplays*.
3. Why and how did our forefathers gain their independence from England?
   a. Make booklets containing the pictures and the life history of all the great patriots who defended the American ideals and institutions.

[1] See classified list of films in Appendixes A and B.

b. Dramatize the signing of the Declaration of Independence, Betsy Ross making our flag, Washington at Valley Forge, the Constitutional Convention.

c. Study the following films as need arises one at a time: "The Era of the Revolution," "Alexander Hamilton," and "Yorktown"; also "Hats Off" and "Paul Revere's Ride." [1]

d. As final review of this period of history, arrange a pageant involving the great events and dominant personalities that were instrumental in organizing our new government. Use pictures to gain correct ideas regarding costuming and settings. Each pupil may choose the character he wishes to represent, such as Washington, Hamilton, Franklin, Lafayette, Morris, and Jefferson; and, dressed appropriately, may enact the part played by that character in developing the new government.

4. What does our government do for us as citizens?

a. Collect pictures of postal buildings, mints, life-saving stations, naval stations, lighthouses, national parks, forest ranges, canals, roads, and so on, to show how all our comforts, safety, and enjoyment are guarded by our government, and how for this in return we pay taxes and serve as honest, helpful citizens.

b. Use such films as "A Citizen and his Government," "What Uncle Sam can do for Two Cents," "Our National Parks," "Washington, D.C." [1]

5. A few important dates should be remembered as milestones in history and can be remembered best if they are visualized in relation to an event. As a class project make large posters depicting an event or a symbol for an event and its accompanying date such as Columbus's three ships — *Santa Maria, Niña,* and *Pinta,* 1492; Liberty Bell for Declaration of Independence, July 4, 1776; picture of landing of the Pilgrims, 1620; picture of the House of Burgesses, 1619. Fulton's *Clermont,* 1807; picture of the pony express and the Union Pacific Railroad engine at Promontory Point, Utah, 1869; picture of miner panning gold, 1848.

[1] See classified list of films in Appendixes A and B.

VI. Social Science Problems

At this point it seems fitting to take up specific problems in history which pertain to current life. Many problems of this type have already been suggested on pages 276–284, in the chapter treating geography.

It is not thought necessary to offer further suggestions here for the work during these years. Upper-grade teachers who have read the foregoing discussion will be able to make their own uses of the methods outlined.

CHAPTER VII

VISUAL INSTRUCTION IN OTHER SUBJECTS

NATURAL SCIENCE

To him who in the love of Nature holds
Communion with her visible forms, she speaks
A various language; for his gayer hours
She has a voice of gladness, and a smile
And eloquence of beauty, and she glides
Into his darker musings with a mild
And healing sympathy, that steals away
Their sharpness, ere he is aware.

BRYANT

Scope and importance of natural science. Like the science of geography, of which it is fundamentally a part, elementary science, or nature study, as it is commonly called, is particularly concerned with plant and animal life, natural forces and phenomena, and the relation of these to man. There is nothing that so develops the great human side of life as the intimate study of the world of nature. Like music, art, and literature, nature study not only enriches life but also tends to introduce into life an influence that is restful, stimulating, and educative. In caring for pets or cultivating a little garden plot, a child incidentally learns innumerable things that books and instructors rarely teach, such as kindliness, gentleness, humaneness, and a keen sympathetic and appreciative feeling toward all living things.

Primitive man lived near to nature; but, with the development of civilization, man has gradually become more interested in the mechanical and artificial affairs of life

and less interested in nature and the great world out of doors. As a result, people have become nervous, restless, commercial individuals. Even the modern child is too often overstimulated with artificial devices. It seems a serious mistake to develop the commercial and mechanical interests of man to the exclusion of an intelligent interest in nature. No individual can progress wholesomely without those interests which tend toward spiritual growth. There was never a time in our national history when the need was greater for ethical and spiritual training than at present. "The consummation of happiness is the natural outcome of the perfecting of character," says John Fiske. Much crime might be prevented if the interests and thoughts of young children were guided away from self and from unwholesome amusement toward the beautiful, natural, inspirational things of life.

Children must be busy at something; it is a natural tendency to be ever active. The love of nature is also a native instinct, that seems to belong to all healthy-minded young children but, like other tendencies, if it is not developed and nurtured by experience and encouraged to express itself, it may wane or even be crowded out by other more artificial interests. The study of nature keeps alive the powers of intelligent observation and of curiosity *to know*. As these are the powers which lead to a richer life, such a subject should be emphasized throughout all school life.

Objectives in teaching natural science. The chief aims in teaching natural science are to develop a deep and abiding interest in natural objects and the phenomena of nature; to acquire a reverence for life and all living things and appreciate man's relations to other forms of life; "to live in nature with active senses," as Lord Bacon said.

In teaching nature study, Dr. Clifton F. Hodge[1] says:

> The paramount value to be aimed at is *character, will to do good, power to create happiness.* No lesson that does not contribute toward this end can claim a right to a place in the course. ... We cannot expect intelligent observance of laws until the facts of nature upon which they are based become common property of the community. To lay this foundation for right living is certainly one of the functions of a public school system.

Informality of method. The capacity for the appreciation of the Creator's great handiwork is latent in every human soul, but it must be nurtured during the early, plastic stages of a child's development by concrete stimulation. It is sometimes stated that the subject is a difficult one to teach. Does the fault not lie with the teacher, who is herself not a lover of nature? The successful teaching of any subject depends very largely on the wholehearted enthusiasm of the teacher. Enthusiasm is one of the most contagious things in the world.

One most successful teacher of elementary nature study had had no formal training in the subject, but she was a natural lover of nature and children. By wisely following the native interests of her children, teacher and pupils learned and developed together.

One day a boy of this group (sixth grade), who had displayed very little interest in his formal studies, brought into the classroom a glass jar containing several beautiful "strawberry" spiders, whose bodies looked like perfect, luscious strawberries or round red emery bags from mother's sewing basket. Naturally the teacher and pupils displayed much interest and were curious to know where the spiders had been found. Encouraged by a few leading questions, this boy revealed a most fascinating story of the life and habits of these strange creatures. He had spent

[1] *Nature Study and Life.* Ginn and Company.

hours sitting quietly in order to study these spiders in their native haunts. He carried his interesting message to the various grades, and his enthusiasm was contagious. Every child in the school began to look for and study the crafty little spider — nature's most expert spinner and weaver.

The next day a pupil brought in a perfectly formed home of the trap-door spider (Fig. 124), which had been obtained sometime previously from the southern part of

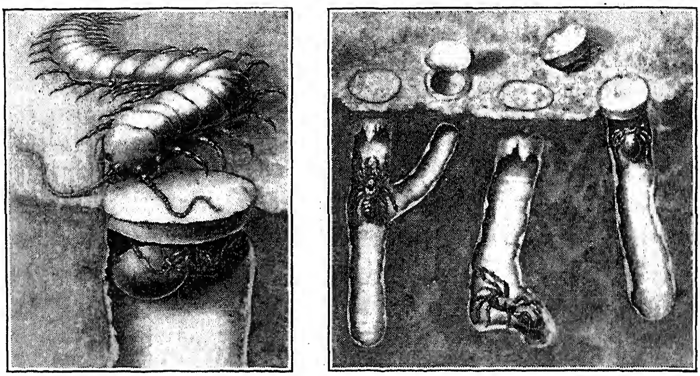

FIG. 124. The trap-door spider and its home
Courtesy of Compton's *Pictured Encyclopedia*

California. This marvelous little piece of masonry, with its perfectly working hinged door, which snaps shut to protect its occupant from danger, filled the children with still greater curiosity and resulted in an organized plan for the study of spiders.

First the "strawberry" and the common "garden" spider, which could be studied first-hand, were taken up. Each day leading questions were placed on the board to stimulate thinking and to guide their study in books. Is the spider an insect? How does the garden spider spin its magic web? Why is it called "Nature's little bandit"?

Is spider silk of commercial value? What lessons may be learned from the crafty little spider?

Some readers may have a strange aversion to these unattractive-looking creatures and question the good that may come from such a study, but let us see what lessons were learned that tended to enrich life and develop character through the actual study.

1. An *appreciation* and *reverence* for all living things was certainly gained while studying the almost magical way

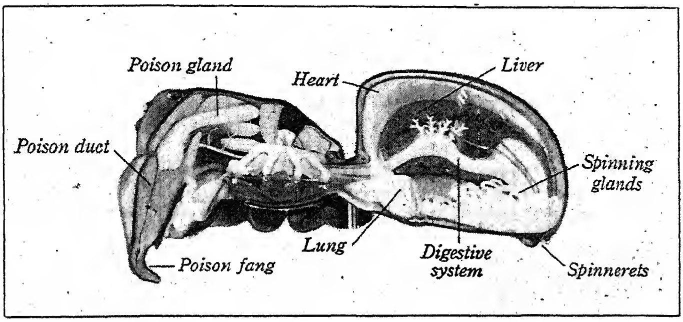

FIG. 125. A magnified cross section of the common garden spider, showing spinnerets and spinning glands

Courtesy of Compton's *Pictured Encyclopedia*

in which the garden spider dexterously throws out its silken thread to spin its marvelous orb web, which is almost geometrically perfect.

2. An impressive lesson may be learned of the way nature has endowed every living thing, plant and animal, with a physical means for obtaining sustenance and protecting itself from its enemies. The garden spider is provided with several sets of "spinnerets" (Fig. 125) from which are expelled the silken threads that are woven into the beautiful, fairylike orb webs. These artistic spiral webs are woven not for homes but as traps with which

Mrs. Spider may catch food for her family (Fig. 126). On completing her net of sticky threads, she secretes herself, and with her many keen eyes wide open, she awaits the coming of her prey. Nature has provided Mrs. Spider with sharp curved claws under which are secreted ducts

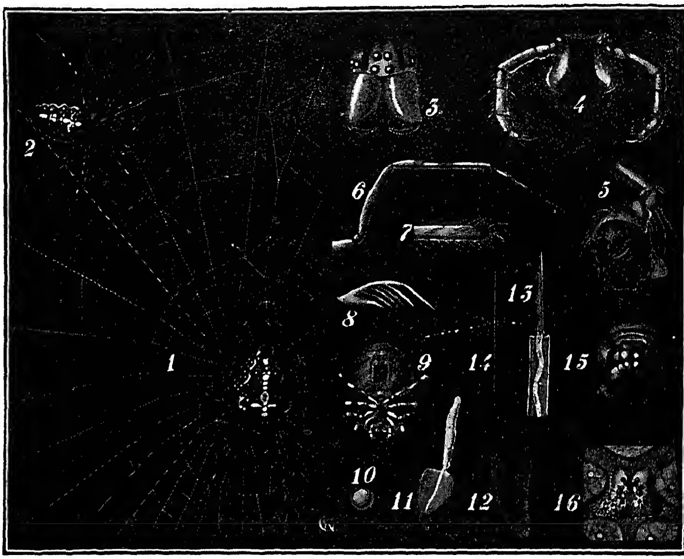

FIG. 126. *Epeira diadema,* the common garden spider

1, female on her resting place in the web; 2, male; 3, head; 4, upper mandibles with feelers; 5, left upper jaw of male; 6, left fore leg of male; 7, extremity of foot; 8, claw; 9, undersurface; 10, egg; 11, poison gland; 12, point of poison gland; 13, silk-producing gland with thread; 14, radial and cross thread from the outer part of the web; 15, spinning apparatus, exterior view; 16, spinning apparatus, showing the portion around the four white spinnpapillæ. (Courtesy of the Denoyer-Geppert Company)

containing poison to kill her victims. With these weapons, spiders may capture insects many times their own size, quickly kill them with their poisonous claws, suck their victim dry, and cast aside the remaining carcass. Other splendid lessons are gained from the trap-door spider;

from the water spider, which protects its young in a home at the bottom of quiet ponds; from the aëronautic spider, which sails through the air by means of little fluffy clouds of cobwebs; or from the brave wolf spider, who leaves his underground home and runs down his prey in an open race.

3. Interesting and impressive lessons in parental love are taught through the study of the lower forms of life.

Some spiders spin little cobweb pouches in which to carry their eggs in safety. The wolf spider drags her egg sac with her until the eggs are hatched; then the young are carried on the mother's back, papoose-like, until they are strong enough to shift for themselves.

The water spider builds her nest securely among the weeds at the bottom of ponds and then skillfully catches bubbles of air on the surface and carries them down to her nest so that her young may have plenty of fresh air.

4. Where could we look to find more impressive lessons in courage and patience? The little spider may spend over an hour spinning a wonderful spiral web only to have it wrecked by the wind or rain, but undaunted she proceeds in the same courageous way to rebuild her web anew; for Mrs. Spider knows that her food trap must be spun or she will go hungry. Children may also read stories of how spiders spin the first little silk cables and then sit patiently until a gentle breeze comes and carries the little cable to a distant twig so that further weaving may be carried on.[1]

[1] Books and pictures for the lessons above:

COMSTOCK, ANNA BOTSFORD. *Handbook of Nature Study for Teachers and Parents.*
COMPTON'S *Pictured Encyclopedia.*
FABRE, JEAN HENRI. *Insect Adventures and Life of the Spider.*
GILLESPIE, F. B. *Mother Spider.*
HOWITT, MARY. *The Spider and the Fly.*
Motion picture, "Spiders and their Victims." Kineto Company of America.
Story of Robert Bruce and the Spider.

In teaching nature study to young children it does not seem so important *what* or *how much* we teach as it is to lead children to become wholeheartedly interested in some phase of nature, be it birds, insects, animals, flowers, trees, or agriculture. Teachers should aim to find out what children are interested in and encourage research along that line. Life is always full and rich for lovers of nature. It is well to have a hobby along this line. Fortunate, indeed, is the adult who learned to find joy in nature in early youth.

Visual instruction in teaching natural science. It does not take much insight into child psychology to realize that natural science must deal with realities — with objects and things. In no subject in the curriculum is a textbook so inadequate when used alone as in the study of nature. The study is based almost wholly on concrete observation, and necessitates a constant use of live things, specimens, pictures, stereopticon, and microscopic projection.

In the first place, it is through observation, through the seeing experience, that curiosity and interest are first aroused. In the second place, the study of any phase of nature would be limited and unsatisfying were it not for the broad use of visual aids. In the case of the study of the spider in the foregoing lessons it was only through a constant use of visual materials that concrete information was gained and interest was increased and prolonged. For instance, it was only through the actual seeing of the strawberry spider that general interest was first aroused. But that live spider could not be handled and examined as would have been necessary in order to answer the many questions that arose. It was only through the use of pictures, and particularly the stereopticon slide, which showed the spider magnified many hundred times, that the children, as a group, were able to study the various spiders in detail. Furthermore, it is not always possible

to get animals to perform as desired. The spider or caterpillar will not always spin naturally when confined in jars or dry aquariums. Here the motion picture is unsurpassed even by nature itself. Insects and other living creatures of every description from all parts of the country are brought into the classroom that pupils may see highly magnified pictures of the minutest creatures weaving webs, spinning cocoons, catching their prey, and living their strange lives in their native habitats, all unaware that anyone is observing them.

By means of the X rays and microscopic attachment used on the modern camera the naturalists have been able to reveal to us many of the most puzzling secrets of nature. Therefore, even though we have access to many live specimens, other visual aids, such as habitat-group cases, colored pictures, stereopticon slides, and motion pictures, are of tremendous value and ought to be used freely in every nature-study class.

Pictures of various kinds and specimens may be used very profitably to prepare pupils to know just what to look for on an excursion, and to recall and fix facts permanently in the mind after an excursion has been taken.

Correlation of subject matter. As has been emphasized many times in this volume, no subject should be taught in any grade as a thing apart, — as a separate subject, — but rather as a contributing factor of the great mass of valuable knowledge which tends to enlighten and enrich life. This is probably more true with regard to nature study than any other subject. Since nature study is so closely related to life and the world about us, it is fundamentally closely connected with the broader subject of geography. Therefore interest and motive for study of many specific nature-study problems arise as a natural outgrowth of certain geography lessons.

By this informal plan of attack, teachers are more likely to meet the immediate interests of boys and girls. To illustrate: While a group of primary children were studying about the Eskimos the teacher guided their interest toward the domestic animals of these peoples of the Far North. For many days the nature-study period was devoted to the study of the life and habits of the Eskimo dog and reindeer (Fig. 127). This led to a most interesting study and comparison of dogs, cows, goats, horses, and various other domestic animals. Nor did the interest of the pupils and the study of domestic animals end here; it continued throughout the term. The prescribed course called for a study of types of peoples of other lands: their food, clothing, and shelter. Thus the study of the domestic animals of the various peoples was taken up in a concrete way. As the study progressed, each child made an attractive booklet containing compositions on animals. These booklets were illustrated by pictures of domestic animals found in all parts of the world. They told the stories and showed pictures of the camel of the Sahara Desert, the elephant at work in India, the water buffalo drawing big two-wheeled carts in the Philippines, and the llama and the donkey carrying packs on their backs up the steep trails of the Andean highlands.

FIG. 127. Alaskan sled reindeer

Other opportunities for interesting nature-study lessons may be taken advantage of, such as the following:

1. While studying Holland in the spring, children can plant tulip and hyacinth bulbs, and study their cultivation and beauty. (Excellent pictures can be gained from good seed and bulb catalogues.)

2. When studying Spain and Portugal pupils can make a study of the cork oak and compare it with the oak trees in their vicinity.

3. The study of the hot belt offers an excellent opportunity for study of food-producing trees, such as the various palm trees, the coconut, date, and banana.

4. The study of the cotton industry of the Southern states will naturally stimulate an interest in the boll weevil and other destructive insects and plant diseases.

During the study of the Panama Canal, one class became deeply interested in the study of mosquitoes, as a result of reading about General Gorgas's work in combating that disease-spreading insect in the tropical climate of Panama. This study led to an interest in other insects harmful to man, such as the fly.

In developing these lessons the pupils found the two films "Mosquito"[1] and "Swat That Fly"[2] very interesting and instructive.

Art, music, and literature should also play an important part in elementary nature study. It is only when children are interested in certain birds, flowers, or insects that they can fully appreciate the significance of nature songs and poetic verses.[3] After children have learned to appre-

[1] Distributed by the University of California and Kineto Company of America, New York.

[2] "The Mosquito," by the Pathé Exchange Inc., 35 West Forty-fifth Street, New York.

[3] See pages 454–459, Appendix B, for a classified list of nature poems and masterpieces in art, which can be used effectively with nature-study lessons.

ciate animals through interesting experiences, they are more capable of enjoying such masterpieces in painting as Rosa Bonheur's "Horse Fair," Mauve's "Flock of Sheep," Murillo's "St. John and the Lamb," and Millet's "Feeding her Hens." It is also while this interest is keen that children may find great joy in reading or memorizing such selections as Stevenson's "Cow," Wordsworth's "Daffodils," Riley's "Bumble Bee," or Markham's "At Little Virgil's Window." Many of the most appealing nature poems have found their place in the modern school music books and have long been closely correlated with nature study in the primary grades.

Distribution of subject matter. Any outline of distribution of content for different groups must of necessity be very flexible and of a suggestive nature only, for two reasons: (1) the content of nature study is broad and far-reaching, and (2) the definite needs and interests of boys and girls of varied communities should be met. The topics studied will be governed in part at least by seasonal changes, and will be more or less the outgrowth of an interest manifested by some individual or group. The following grouping is offered only to show how visual materials may be used to make each lesson more interesting and valuable.

I. Primary Grades

If an attempt is made to follow the interests of primary children, teachers will begin with the common things of life and make them fascinatingly interesting. Little children seem intensely interested in animals, especially their own pets — cats, dogs, or rabbits. Every primary room ought to have a clean, airy cage for pets, so that the individual children may bring their pets to school for close

observation and group discussion. These pets may be a means of motivating oral expression, language, writing, and spelling, and they may provide a subject for a nature-study lesson as well.

Habitat-group cases of birds and small animals of the immediate vicinity may be used in the same way as objects for study and observation.

One of the suggested activities for the low primary grades is the farm project, a study of plant and animal life on a small farm.

Problem. Where does our common food come from?

While groups of primary children are reading the "Little Red Hen" or "Work-a-day Doings on the Farm" by Serle, or other such stories, teachers may guide the children into a useful study of farm life.

First. What does a farm look like?

Have the children make a careful study of a few simple pictures showing small farms; then guide them to transform one of the largest sand tables into a small country farm, such as might be found in the near vicinity.

Second. What animals live on the farm?

From their stories they learn about the dog, cow, horse, pig, sheep, chickens, and possibly rabbits that live on the farm. Step by step each animal can be studied carefully as to its habits, food, and specific use on the farm. Needless to say, valuable colored pictures, such as prints, stereographs, and slides must be used constantly in order that correct impressions may be gained. It is also well to have the children make little farm or animal booklets in which they mount their own pictures, draw sketches, and write little stories. As each animal is studied, tiny toy animals or modeline sheep, cows, and pigs may be placed in their proper places on the sand-table farm.

Third. What plant foods grow on the farm?

Through the use of the stereograph, the colored slide, and exhibits each day one food plant may be studied, such as potatoes, peas, cabbage, carrots, melons, berries, fruit, and wheat. Each day a different fruit or vegetable may be raised, in make-believe, in the sand-table garden and, after serving its purpose, may give place to another. Twigs stuck in the sand may represent orchard trees, and bits of colored paper may be tied to the fruit trees to represent blossoms.

Wheat may be actually planted in a little section set apart for grain. The growth of the tiny shoots of green grain thriving in the sand-table farmyard makes a pretty picture and delights the children. Other seeds, such as radishes, beans, and carrots, may be planted in window boxes or out of doors so that the children may have a chance to study plant growth.

Fourth. What are the activities of boys and girls on the farm?

This problem offers an excellent opportunity for children to compare the activities of country life with those of a village or a city. Through well-selected pictures children may be led to appreciate the joys of life in the country. They may see the farmer lad feeding the chickens, caring for a motherless lamb, helping his father gather potatoes, galloping over the fields on a horse, or leisurely fishing beside a shady stream.

Visual materials for the lessons. Farm magazines and fruit and vegetable-seed catalogues furnish an unlimited source of supply for flat pictures. For masterpieces in art and nature poems and songs which could be used in the lessons, see the classified list in Appendix B. E. Boyd Smith's *Farm Book*, which shows pictures of plowing, sowing, reaping, churning, feeding chickens, and going to market, is an excellent picture book to use in studying farm life.

Excellent stereographs and corresponding colored slides showing the activities of children on the farm, vegetables, fruits, and animals may be selected from the catalogues of the various dealers in stereographs and slides. The following set of stereographs and slides[1] has rendered excellent service in one school system.

1. Climbing Pasture Fence. No. 11493.
2. A Holiday with Rover by the Stream. No. 11495.
3. Fishing in the Brook. No. 21310.
4. Farmyard Animals. No. 21325.
5. Petting the Colt. No. 21326.
6. Shetland Pony with a Week-Old Foal. No. 26288.
7. The Horse Jerry Feeding from a Basket. No. 9603.
8. Cow at Milking Time. No. 965.
9. Calves Learning to Drink from a Pail. No. 21307.
10. Cattle Feeding in the Pasture.
11. Little Pigs Feeding from their Mother. No. 8098.
12. Genuine Corn-Fed Hogs in Washington State.
13. Lambs and Sheep in a New England Farmyard. No. 23100.
14. Three Thousand Sheep on a Montana Ranch. (Showing shepherd and his dog.)
15. Shearing Sheep by Hand. No. 22129.
16. Feeding a Motherless Lamb from a Bottle.
17. Chickens on a Ranch in California. No. 23086.
18. Turkeys in the Barnyard. No. 21308.
19. Turkeys Feeding in a Grain Field.
20. Ducks in the Farmyard. No. 6073.
21. Potato Field on a Truck Farm, Buffalo, New York. No. 6716.
22. Tomatoes Growing in a Home Garden. No. 16659.
23. Wheat Field, Washington State. No. 11624.
24. Picking Red Raspberries, New York State. No. 13734.
25. Picking Red Apples, Washington State. No. 13730.
26. Cornfield, Kansas.[2]
27. Field of Pumpkins.[2]
28. Field of Watermelons.[2]

[1] Handled by the Keystone View Co., Meadville, Pennsylvania.
[2] Asahel Curtis Photo Company, Colman Building, Seattle, Washington.

For lessons on farm life teachers may have excellent slides made from their own negatives; in this way they can better meet the needs of the specific groups with whom they are working.

A school zoo provided a primary-grade project involving the study of the various jungle animals. Following the

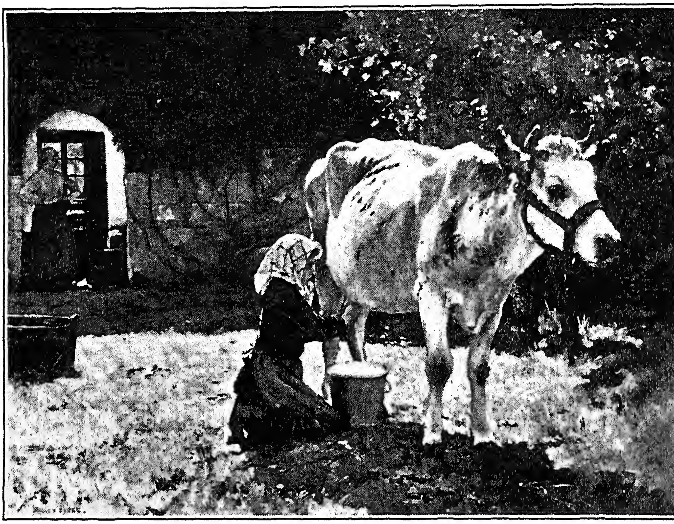

FIG. 128. "Milking Time," by Dupré

Masterpieces of art may be used effectively in developing lessons on farm life. (Courtesy of the Brown-Robertson Company, Incorporated)

visit to a circus, a group of third-grade children suddenly manifested great curiosity and interest regarding the wild animals they had seen there. The teacher therefore suggested that they find out more about them. The jungle animals of central Africa were chosen as the most interesting for a detailed study; and the elephant, the emperor of the jungle, topped the list as the one to receive consideration first.

The procedure was as follows:

1. The children decided to transform a corner of the classroom into a zoo. As the elephant was studied, habitat-group cases were made by various individuals. Some used shoe boxes; others, larger wooden boxes. Pieces of palm trees and green cut paper were used to make the native environment as realistic and truthful as possible. Pictures and books were constantly consulted. Some children modeled their animals out of clay or modeline; others either painted animals on cut-out cardboard or used suitable colored pictures mounted on stiff cardboard.

2. Each child also made an illustrated booklet of his favorite animal. Pictures were gathered from old magazines and advertising folders.

© Keystone View Co.

FIG. 129. Elephant mother and baby

From a stereograph

3. For many days the group devoted the reading period to reading wild-animal stories,[1] such as are found in Kipling's *Jungle Book*, Smith's *Circus Animals*, and Thompson Seton's *Wild Animals I have Known*. While studying the elephant, the teacher read "Mogul, the Baby Elephant" from Compton's *Pictured Encyclopedia*, Herschel

[1] Helpful illustrated books are *Circus Animal* (Rand McNally & Company), by Elizabeth Gale, and *The Circus and All about It* (Frederick A. Stokes Company), by E. Boyd Smith.

Williams's interesting account of elephants at work in the Burmese teak forest from *Asia* (November, 1925), and also a story of elephants from *Japan* (June, 1924).[1]

4. During the daily nature-study period large flat pictures and slides were used while the life and habits of the animals were discussed by the group.

5. One of the most interesting steps was the execution of a picturesque frieze running the full length of a blackboard. Here was depicted a realistic African jungle scene. The teacher, with the aid of the children, had cut out those attractive crêpe-paper animals produced by the Dennison Manufacturing Company, stuffed them with a little cotton, and pasted them on the board in a natural setting of dense tropical foliage drawn artistically with green crayon. Here was to be seen a huge elephant winding his way through the jungle to drink in a clear blue stream; farther on was a tall giraffe nibbling the tender leaves from the tops of trees, a monkey hanging from the limb of a tree, and a fierce-looking lion about to spring upon its prey.

6. Two sets of motion pictures added interest and enthusiasm to the study, and practically crystallized the whole research into a living experience. The impressions made were deep and lasting, because the children had been in the very presence of these interesting animals and had mentally lived with them in their native haunts.[2]

A class bird book was another activity developed by a second-grade group.

1. The class teacher made a large loose-leaf binder, fourteen inches by twenty inches. The heavy cardboard backs were covered with beautiful cretonne in a bird

[1] Excellent pictures may be found in both magazines.

[2] The pictures used in these lessons were "Wild Animals of Africa," by H. N. Snow, and "Teak Logging of Siam" (elephants at work), by Burton Holmes.

design. As each bird of the vicinity was studied, a good picture of that bird was mounted in the big bird book. On the same page a picture of the nest or eggs, or both, if they could be found, was pasted. Each day the teacher called for interesting facts regarding the bird which was being discussed. These facts were written on the board and worked over into stories until the children thought

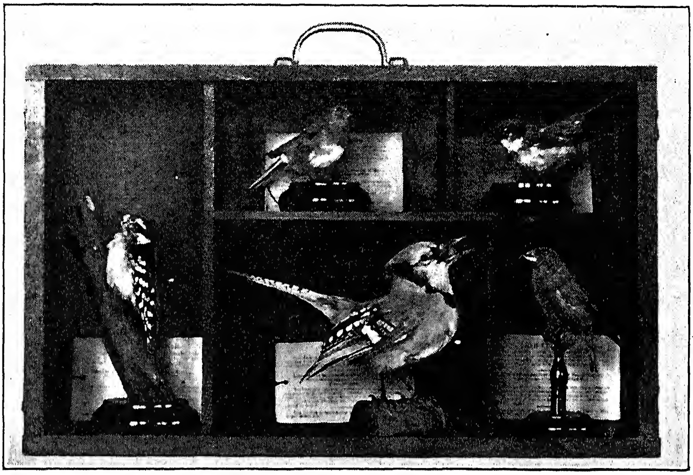

FIG. 130. A safe way to send mounted birds into the classroom
Courtesy of the American Museum of Natural History, New York

them sufficiently worth while to accompany the pictures in the bird book. When the children were satisfied with the form of the stories, the teacher printed them in the book.

At the end of the spring semester the group had developed a beautiful and valuable reference book for about fifteen of the most common birds of that vicinity. The class unanimously voted that the book should be donated to the school library in order that it might serve other children as it had served them.

II. Grammar Grades

The school garden furnishes one of the finest mediums for practical nature study. It offers a broad opportunity for close observation and study of the unfolding of plant life. It gives acquaintance with types of soil, need of irrigation, fertilization, harmful insects, and plant diseases. The school garden tends to become a connecting link between all nature study and life in general. Through it city boys and girls may be led to appreciate and understand that great mass of our population which furnishes them with the food they eat. Through participation in caring for the school garden, children may be led into a deeper study of the wild plant and animal life. Working in the soil in this way certainly uplifts and invigorates, thus enriching life.

Normal boys and girls unquestionably *can* be guided to a tremendous interest in gardening both at school and at home. All they need is inspirational encouragement from a sincere, enthusiastic teacher.

One city school which was fortunate in having ample ground proceeded as follows:

1. The fifth and sixth grades met in a conference with the teachers and principal to discuss ways and means of carrying on the regular school-garden work. It was decided that the garden plot of fifty feet by one hundred feet should be divided into four equal parts, so that each of the four classes might be responsible for a certain plot and specialize on a certain type of crop. One group chose string beans; another, corn and pumpkins; another, peas; and the fourth chose the rapid-growing vegetables, such as radishes, onions, and carrots.

2. While plotting the garden patches and preparing the soil for the seed each group studied carefully in their text-

books, Ernest Cobb's *Garden Steps* and Cyril A. Stebbins's *Principles of Agriculture through the School and the Home Garden*, how to prepare the soil for their particular crop. Illustrated vegetable-seed catalogues were obtained, and the pictures and reading matter closely studied, in order that a wise choice might be made in the variety of peas or beans they should plant. Before a seed was put into the soil each child had a clear mental picture of what his crop would look like when it matured.

3. Each group chose a business manager or captain, a secretary, a treasurer, and several salesmen to dispose of its crops. The captain organized the groups into working squads; for all could not work at the same time because of the limited number of tools. Three school periods a week were devoted to gardening, but the children were so interested in their work that the recess, noon, and after-school periods had to be assigned to groups.

Great rivalry developed between the groups to see who would have the finest-looking garden, and later to see which crop would bring in the most money.

4. As the crops matured, special notices regarding salable vegetables were sent to the homes, and the market price was obtained from the stores daily. Peas and beans were weighed; radishes and onions were bunched and marketed in first-class order by the class salesmen. Some vegetables, the beans, for example, matured during vacation; therefore a trustworthy boy was hired in each group to irrigate and market crops during the summer.

On returning to school in the fall it was found that the fifth grade had a bumper pumpkin crop. The hardy vines had actually monopolized the whole garden plot. When the crop was ripe an improvised store was rigged up for a special sale of pumpkins on a day when the mothers' club met at the school. Every pumpkin was weighed and tagged.

When accounts were checked up it was found that the net receipts for the season were $32.75. The string beans and pumpkins were the best money-makers. The money was spent for appropriate wall pictures for their new school building; so the gardeners had permanent, pleasant reminders of an interesting season's work.

5. Out of this garden experience came many other nature-study lessons. For instance, while working in the garden several potato bugs were discovered. Comstock's *Insect Life* was consulted and a brief study followed. At another time a mole found his way into the garden, and he received serious attention. Most of the first crop of radishes were literally eaten up by a small boring worm. A few of these little pests were captured and brought into the classroom, classified, and studied under the microscope. This led to a rather comprehensive study of the garden insect pests.

6. In this same school the high fourth grade made a special study of common garden flowers and developed a most beautiful garden at the rear of the schoolhouse.

III. The Secondary School

The following extract quoted from a recent publication illustrates concretely how scientific motion pictures may be used effectively in teaching biology to high-school students.[1]

The subject of reproduction is vital to biology. In a general sense it underlies the formation of all new individuals, whether plant or animal, including human. In a more particular sense it is so intimately associated with eugenics and genetics that a great

[1] Paul B. Mann, "How Moving Pictures Aid in the Teaching of Reproduction," *Visual Instruction Handbook*, Vol. II. Visual Instruction Association of America, 1925.

deal of the modern biological research is directed to the subject of germ plasm and heredity. In high-school classes of biology, zoölogy, botany, and hygiene, one of the important considerations is to keep this subject dynamic and prevent, if possible, a sort of complaisant thinking by pupils, which amounts to a consideration of reproduction as a static relation.

For instance, through statements or pictures in the text, pupils learn that the simplest type of reproduction is that of fission, or simple division, which occurs in the unicellular animals, such as the amœba and paramœcium. But practically no pupil ever watches any of these tiny organisms through a compound microscope up to the eventful moment when it actually divides in two. In my twenty-five years of biological instruction I have been able to show this organic climax but three times, and then not to all the members of the class, because the process was one which could not be prolonged. On the other hand, a scientific film, such as "How Life Begins,"[1] and others similarly made, records the results of days and nights of patient watching by experts in which the all-important events of critical minutes are indelibly caught and beautifully transcribed to the screen portraying the exact details of this rather obscure action.

Moving pictures of asexual reproduction. Other types of microscopic asexual reproduction, such as the budding of the yeast cell or the hydra, or the slipping of a portion of a green plant, can be similarly observed. There is a vast difference in an adolescent class in the degree of interest stimulated, knowledge gained, and enthusiasm kindled between observing this living process of budding itself, or seeing merely a preserved specimen or mount of a dead, budded hydra.

In botany it is impossible actually to see the pollen tubes develop from the pollen grains lodged on the stigma of a flower, and then watch them start on their dramatic race down through the slender style to the egg cell nucleus of the ovule, waiting to be fertilized by the first of them. Thus teachers formerly have had to be content with telling their pupils about this exceedingly

[1] Produced by George Stone; distributed by nearly all university or college circulating departments. See catalogue "1001 Films," published by the *Educational Screen.*

interesting action. A little clearer idea can be gained from a drawing or chart. But unless the pupils have a vivid imagination they will quite fail to visualize and hold in mind the process. Likewise they are likely to be content with furnishing a more or less categorical statement as to the ensuing action, namely, the actual fusing of the male nuclear material, brought by the pollen tube, with the nucleus of the egg cell. It is doubtful if

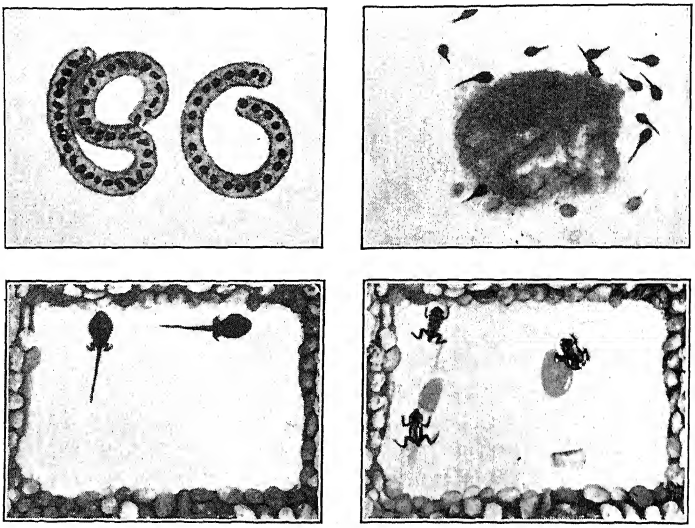

FIG. 131. Part of the life history of the frog

Scenes from a film. (Courtesy of the Society for Visual Education, Chicago)

many children think in terms of what actually happens here, even though they may glibly rattle off a bookish definition.

The inadequacy of other methods. As a matter of fact, pollen tubes and nuclei are microscopic structures, and the physical conditions are such that about the best the livest teacher could formerly do was to show microscopic slides of the structures involved, and from sweet pea, or some other pollen, grow some pollen tubes in a syrup akin to the nourishing carbohydrate of the stigma on a microscopic slide — static structures at best — in an environment admittedly totally unlike that of nature.

The advent of motion pictures has changed much of our biologic pedagogy. For all intents and purposes, when pupils see the second film of the four reels of "How Life Begins" they are putting on X-ray glasses and peering through the opaque walls of the flower into the heart of its mysteries. And it is not static! The combination of clever cartoon work with actual microphotography has here built up a reality, providing a new and profound sense of action and growth — in short, of life. Even the pupils of low I.Q.'s can understand the simple processes as they develop on the screen. After having seen such a film very little constructive teaching remains to be done.

In advanced classes in zoölogy and race hygiene the problem of fertilization and embryonic development in the case of fishes, frogs, birds, and mammals offers the same difficulties as those just referred to in the sexual reproduction of higher plants. It is difficult for pupils to realize just what the statements of the text really mean until the film portrays the salmon and the frog actually spawning. And for the next step, that of animal fertilization, that wonderful microcinematograph of the living egg cell surrounded by myriads of sperms lashing their way and pressing closer and closer in the endeavor to penetrate to the nucleus, becomes a colossal contribution to biologic pedagogy.

The developing vascular system. Short of seeing the specimens themselves (a difficult procedure), nothing is so convincing as the film showing the pulsating heart of the bird embryo, still in the egg, and becoming the first well-differentiated organ of the developing animal. Any pupil can realize the necessity of the vast network of embryonic blood vessels, when he can actually see on the screen a moving-picture visualization of hundreds of capillaries, and the blood itself coursing through them on its never-ending journey to get oxygen from the porous shell and digested food from the yolk, both of which are carried to the actual growing cells of the tiny embryo. Here the scientific film really transfers the scene from the object, too small of itself for the human eye to see either blood or delicate capillaries, to the screen with such enormous magnification that everyone in the room sees with the eyes of a Von Baer.

THE FINE ARTS

Importance of art appreciation. A. W. Dow says:

> Fine art by its very name implies fine relations. Art study is the attempt to perceive and to create fine relations of line, mass, and color. As fine relations (that is, harmony, beauty) can be understood only through the appreciations, the whole fabric of art education should be based upon a training in appreciation.

Opportunities for extending the pupil's appreciation of art abound in every subject of the curriculum, and should be seized eagerly for the training of the individual for all-round social efficiency. Indeed the history, art, and literature of a country are so closely interwoven that each helps greatly to explain and enrich the other.

We are living in a practical and commercial age, and if we wish to safeguard our nation from the dangers of which sociologists warn us, it is necessary to prepare the coming generation in the use of leisure. This means that the emotional and spiritual phases of the child's nature must be taken into serious consideration in planning courses of study. It means further that the school must offer many more avenues of appreciation in art, music, and literature, in order not only that ways and means may be found for the more wholesome use of leisure, but that life itself may be enriched. If one truly loves beauty, it will naturally find expression in his daily life. Dress, home, and school are but outward expressions of inner thoughts and ideals.

Public-school children come from all types of homes and it is in the earliest years of school life that teachers should endeavor to lay the foundation for good taste and proper appreciation of the beautiful. To inculcate this love of the artistic, appeal must be made for the most part through the individual's sense of sight. It is possible through pictures and models to show children how

art is related to their everyday lives — to their dress, homes, school, gardens, public buildings, and parks, and certain manufactured articles.

It is most interesting and encouraging to note the great development in commercial art during the last few years. Advertising posters and shop windows have become examples of real artistic expression. This new development in art emphasizes the greater need for giving children a stronger appreciation of the best in both fine and applied arts.

The use of visual aids in teaching art appreciation. All training in the appreciation of art results very largely from proper significant experiences and from efforts to express artistic conceptions for the purpose of viewing, criticizing, improving, and enjoying them. Broadly speaking, every lesson in art appreciation must of necessity be a visualized one, since an appreciation lesson of this type involves the definite viewing of a fine painting, drawing, etching, photograph or print, a beautifully carved statue, a delicate vase, a piece of artistically woven fabric, or a masterpiece in architecture. If the original is not available, a substitute in the form of a photograph, print, or model must be used as the basis of the appreciation lesson; there is no alternative.

The stereopticon slide is one of the most useful visual aids in teaching art appreciation. The screen picture is large and clear and can be used effectively with large groups. Any art subject may be photographed and a slide made from it.

In choosing prints of masterpieces, teachers should select a superior quality. Cheap prints convey a wrong impression and should not be used for lessons of appreciation.[1]

[1] See list of commercial dealers in Appendix A.

There are many ways in which true art appreciation may be built up through providing art contacts. A few of these will be indicated.[1]

A study of masterpieces of art. The world's masterpieces of art are a part of the heritage of every child. Every masterpiece of art is the result of an inspired soul that

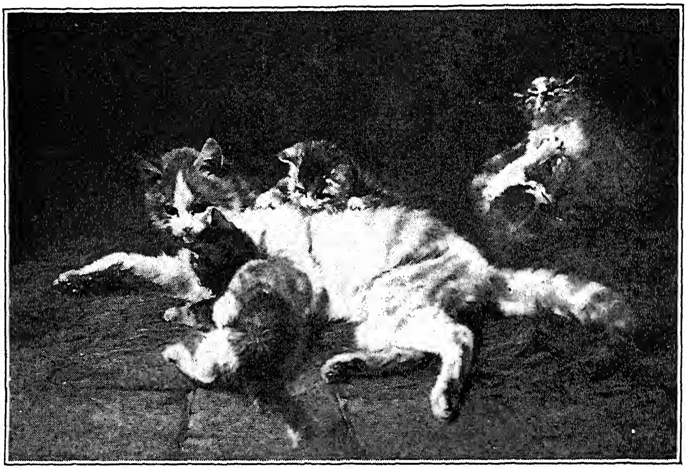

FIG. 132. "Cat and Kittens at Play," by Adam

Art appreciations should be closely correlated with other school activities. (Courtesy of the Brown-Robertson Company, Incorporated)

endeavored to express an ideal or a thing of beauty which others might share and enjoy. Some of these master artists have found expression through painting; others, through sculpture; others, through architecture; and still others, through the various crafts — metal, clay, or textile.

[1] The possibilities of the motion picture as a valuable aid in teaching appreciation of masterpieces in art have been fully demonstrated in the production of "The Voice of the Nightingale" and "The Vision" (see page 413); the latter a film conception of the famous masterpiece "Speak! Speak!" by Sir John Everett Millais.

An artist's rarest effects may be entirely lost to one who has not been trained to interpret the message of artistic expression. Appreciation of nature's grandeur demands capacity for feeling; even so, the enjoyment of a masterpiece in painting, sculpture, architecture, or the crafts is increased by an understanding of some of the fundamental principles governing good art. Although the love of pictures is essentially emotional, an intellectual understanding of them can be developed. This understanding and ability to appreciate and enjoy true beauty in works of art is acquired through constant contact and study of a few choice selections. The careful study each month in every grade of *two* or *three* well-selected reproductions of the world's masterpieces will bring positive results in forming standards for appreciating and enjoying the noble and beautiful in all art.

FIG. 133. "The Belated Kid," by William Morris Hunt

Introduce famous paintings of animals while primary children are studying farm life. (Courtesy of the Brown-Robertson Company, Incorporated)

Picture study must be adapted to the appreciative ability of children; therefore art-appreciation lessons

may be better motivated if they are closely correlated with other school activities. For example, while primary children are interested in the animals of the farm it seems the logical time to introduce Mauve's "Flock of Sheep," Millet's "Feeding the Hens," or Landseer's "Shoeing the Horse." These pictures will make a direct and personal appeal because interest is already aroused. Likewise, while third-grade children are studying the child life of Holland, they are ready to appreciate Jacob van Ruisdael's "The Mill"; and when sixth-grade pupils are interested in the history and geography of Greece and Rome, they may most easily be taught to treasure some of the greatest masterpieces in sculpture and architecture, such as Praxiteles' "Hermes," Michelangelo's "Moses," the Parthenon, St. Mark's Cathedral, and Giotto's famous Campanile at Florence.

In order that picture study may be carried on effectively, each classroom should have a well-lighted space set apart and reserved for picture display. This space should be of ample size so that the picture to be studied seems entirely isolated from any conflicting influences that might detract from its beauty. Such a space should be covered with burlap, heavy paper, cork, or any neutral background that will bring out the beauty of the picture. If blackboard space is limited, a neat bulletin board with a cork face can be made in the manual-training department and arranged with two hooks at the top so that it can be easily hung over a small section of the blackboard when needed.

The following suggestions are given for informal procedure:

1. Motivate the art-appreciation lesson by correlating it with other subjects, such as literature, history, or geography.

2. Make the study a vital part of that lesson so that pupils may understand how art has been a fundamental expression of various types of civilization throughout all ages (Fig. 134). For instance, archæologists determine the status of prehistoric civilizations by studying relics of artistic achievements, such as pottery, which have been excavated from ruins. Children should also be taught how geographic environment has influenced the art of groups of peoples all over the world. Climatic conditions largely determine the style of architecture, — for instance, the steep gables of rainy England, the flat roofs of Egypt and the desert regions. Natural resources have also controlled the type of artistic expression. The Swiss are woodcarvers; the ancient Greeks utilized their marble. Both Holland and China have given to the world the finest gems of porcelain, since these two countries each possess an abundant supply of suitable sand and clay.

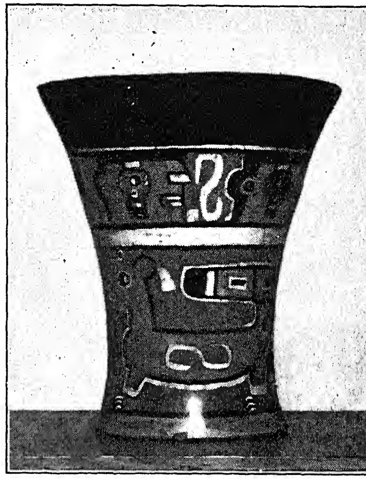

FIG. 134. A Peruvian vase

Pottery has been a fundamental expression of various types of civilization. (Courtesy of the Museum of the University of Pennsylvania)

3. Place the picture or art object in a prominent place with the light adjusted to the best advantage.

4. Allow the pupils to study the object silently before oral discussion, so that individual opinions may be formed.

5. After personal opinions are expressed, definite instruction should be given regarding what to look for in

the subject under observation and the artistic qualities which have caused it to be regarded as a masterpiece.

6. A brief comparison with other subjects previously studied, with respect to certain qualities, such as color composition, rhythm, style, and the like, may deepen the pupils' appreciation of the object before them.

FIG. 135. "The Pilgrims Going to Church," by Boughton

A valuable picture for any group studying early American history. (Courtesy of Brown-Robertson Company, Incorporated)

7. A display of the picture of the artist, with a brief discussion of his life and his purpose in executing the art subject which is being studied, is also interesting.

8. Allow the subject of the lesson to remain before the class a few days so that it may be studied and enjoyed during leisure time.

9. Encourage pupils to keep illustrated notebooks containing miniatures of pictures of the masterpieces studied, with original descriptions and personal reactions. Small miniatures may be purchased for one cent each.[1]

[1] Brown-Robertson Company, miniatures in color, $3\frac{1}{2} \times 4\frac{1}{2}$ inches, 3 cents each. Perry Picture Company, black-and-white prints, 1 cent each.

Distribution of masterpieces for picture study.[1] Since specific interests of children should be met in teaching art appreciation, any suggestive list of pictures must be general in nature. It is likely that no two teachers would have occasion to use precisely the same types of pictures for their different groups. The partial list found on pages 460–469 of Appendix B is offered as a possible source of

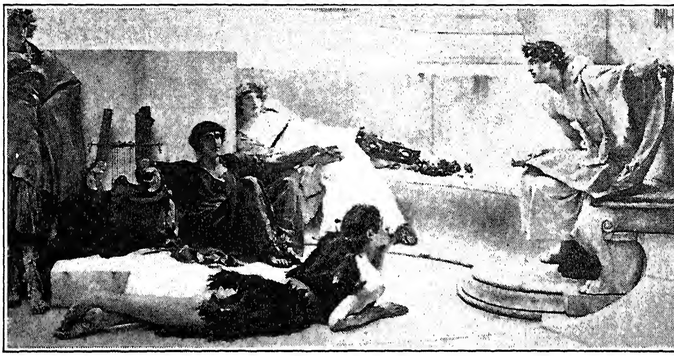

FIG. 136. "A Reading from Homer," by Alma-Tadema

The above masterpiece is often used by sixth-grade pupils while studying the history of Greece. (Courtesy of Brown-Robertson Company, Incorporated)

information from which some teachers may find a *few* choice pictures that will meet definite needs of their pupils at various stages of their development, and at the same time offer an opportunity to inculcate a love of the beautiful in the various phases of artistic expression.

In selecting pictures for the primary grades consideration must be given to color, form, and simplicity of composition. For example, it is difficult to see what first-grade or second-grade children can get out of such pictures as

[1] Bertha Y. Hebb, Appreciation of Pictures, Bureau of Education, Washington, D.C. Contains valuable information concerning the study of pictures and excellent suggestions for courses of study.

Corot's "Dance of the Nymphs," Rosa Bonheur's "Horse Fair," Guido Reni's "Aurora," or even Millet's great masterpieces, like "The Man with the Hoe" and "The Angelus." It is evident that the first three of these pictures are not only too complex in composition for primary children, but the significance of such pictures as Millet's famous studies of French peasant life, for example, is too difficult to be comprehended. Their study should be postponed to the sixth grade, when pupils have become interested in the peasant life of Europe.

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BACON, DOLORES. *Pictures that Every Child Should Know.* Doubleday, Doran & Company.

BOAS, BELLE. *Art in the School.*

BOOTH, MARY JOSEPHINE. *Index to Material on Picture Study.* F. W. Faxon Company.

BRYANT, LORINDA MUNSON. *Famous Pictures of Real Animals.* Dodd, Mead and Company.

CARPENTER, FLORA L. *Stories Pictures Tell.* Rand McNally & Company.

DANA, JOHN COTTON. *Modern American Library Economy: The Picture Collection.* Elm Tree Press.

EMERY, M. S. *How to Enjoy Pictures.* The Prang Company.

HEBB, BERTHA Y. *Appreciation of Pictures.* Bureau of Education, Washington, D. C.

HORTON, ANNA V. *Teacher's Manual and Study Outlines for the Art Appreciation Collection.* Art Appreciation Publishing Company.

HOYT, D. L. *The World's Painters and their Pictures.* Ginn and Company.

HURLL, ESTELLE. *How to Show Pictures to Children.* Houghton Mifflin Company.

NEUHAUS, EUGEN. *The Appreciation of Art.* Ginn and Company.

POWERS, ELLA M. *Stories of Famous Pictures.* Educational Publishing Company.

SHEPARD, FREDERICK J. *Index to Illustrations.* Chicago American Library Association.

HOUSEHOLD AND MANUAL ARTS

Importance of household and manual arts. Household and manual arts introduce boys and girls to the realm of practical useful living. These studies have to do with the great universal problem of life, — namely, man's struggle for food, clothing, and shelter. Today no thoughtful

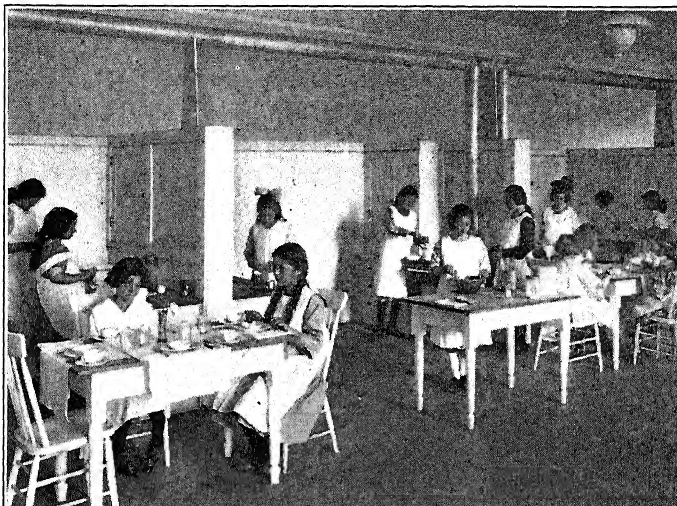

FIG. 137. Learning to cook in dainty, sanitary school kitchens

person questions the importance of the teaching of cooking, sewing, and manual training in the public schools.

The training derived from such teaching is planned to give boys and girls a broader practical and cultural experience. It makes them more independent and more useful men and women. This training gives the pupil new modes of self-expression, enlarges his acquaintance with life, and tends to "develop those areas of the brain that lie fallow unless stimulated into productivity through

motor activity, and thus makes it easier for him to know his own aptitudes."

Such work as preparing a breakfast in a dainty sanitary school kitchen, making a new apron, or building a flower-box for the classroom window satisfies the native instinct for manipulation and construction and at the same time prepares pupils to be better home makers and citizens.

The home is the foundation of society. Any education that tends to strengthen its ties, to lighten and dignify its daily responsibilities, and to improve the general standard of living certainly deserves supreme consideration. Both household arts and manual arts arouse the vital interest of children, and this interest leads directly to the acquisition of the various skills that are required to accomplish the varied duties of living. The work of the upper grades is specifically planned to furnish practical information and experience in the typical, modern, constructive industrial processes. Manual arts, more than any other one subject, should aid the youth to a better interpretation and mastery of his social environment. It is through this medium that he becomes intimately acquainted with the workers of the world.

Value of visual instruction. Fortunately the domestic and manual arts thus far have escaped the formalizing process which has been experienced by other subjects of the curriculum. Because of the very nature of these subjects, learning on the part of the child must of necessity be gained through actual seeing and doing. The printed page is almost helpless unless complemented by adequate pictorial charts, diagrams, exhibits, and models to illustrate and explain the meaning. The use of these and the other visual aids — photographs, slides, motion pictures — arouses interest and enthusiasm and makes it possible to convey quickly definite instructions.

A "Girl-Scout Vacation" film, showing that a knowledge of cooking, housekeeping, and the emergency use of a needle and thread, are an aid to a joyous week-end in camp, gives great zest to class work. In the sewing class a perfect hum of enthusiasm goes around when a new and attractive model is found on the display board. If there is lack of interest it comes largely from a lack of success,

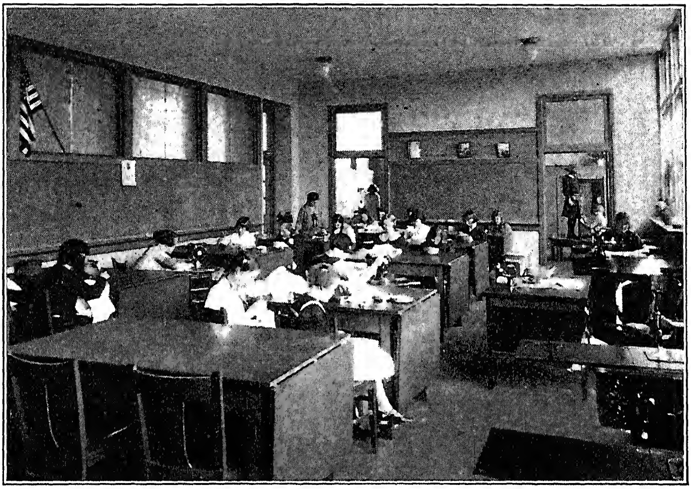

FIG. 138. A modern school sewing room

which frequently results from an insufficient understanding of the project before the worker starts to cut or sew. In the sewing classes, a thorough examination of carefully made models will do away with a great deal of the ripping so disastrous to young enthusiasm, and make decidedly for efficiency and economy of time. One teacher found that the time required for the hemming of the cooking-class aprons, which frequently proves a tedious task, was greatly decreased by a display of attractively decorated pockets to be applied after the hemming was done. In the

cooking class failures result from a lack of understanding and have the same effect as in the sewing work. Such failures can generally be prevented, and it is here that visual aids prove their especial value.

In the sewing work practically all instruction should be visual. It is merely a question of selecting the best aids for the particular task at hand. In teaching girls how to hold a needle, use a pair of scissors, make a buttonhole, or turn a hem, teachers must be able to judge wisely whether a graphic chart, a slide picture, a model, or a personal demonstration will, with greatest economy of time, best "carry over" to the mind of the girl.

A teacher can show only one girl at a time how to hold a needle or fell a seam, whereas a series of pictures demonstrating these lessons projected on a large screen not only saves much time but secures greater efficiency. When schools are equipped with sets of these slides or still films, girls may teach themselves when the lessons are needed. They may study the slide lessons over and over again while the teacher is busy with other duties.

Dangers to be avoided. The only dangers to be avoided in the use of visual aids in home economics are the use of too many models or pictures at one time and the use of films and slides not fully coördinated with the class work. Where too many different models are exhibited at one time, interest is more scattered, and the child is likely to hurry through one project in order to start another, the new one naturally appearing more desirable than the old.

Most films are worth very little unless used as a means to an end. The child should know beforehand why he is to see a certain film and of what use it is to be to him. Then, too, the benefits of the film may be very greatly lessened by the fact that the teacher has not previewed it and thus has not been able to see that the class pos-

sessed the necessary fund of information for an understanding of the subject matter.

The training that may be given in the up-to-date domestic art class is broad and of both a practical and cultural nature, often provoking interesting lessons in art, history, or geography. Visual materials may be used in the teaching of many different lessons in household arts.

FIG. 139. Educational character dolls

From left to right, a girl of 1860, a Scotch laddie, a girl and boy from Holland. The first two were dressed by pupils in the sewing class

Dress. Let the girls make a collection of well-mounted pictures of simple but attractive house dresses, school dresses, and party dresses. Original designs made with water colors may inspire girls to make their own clothes.

An excellent project for girls in the intermediate grades is a comprehensive study of the native costumes of the peoples of the world. This project may be closely correlated with the geography work.[1] The history of the world

[1] A set of one hundred stereographic and stereopticon views of native costumes of the peoples of the world may be purchased from the Keystone View Co., Meadville, Pennsylvania. These may be had in color.

or the history of the United States offers other valuable opportunities, such as a study of the costume designs of women and men of the outstanding periods of world history, or the evolution of dress in the United States, beginning with the early colonial period. Attractive costume pictures may be gathered from magazines or copied and painted from books. Interesting booklets may be made, manikins may be dressed, and dramatization participated in.

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BRAUN and SCHNEIDER. *The History of Costumes.* Braun and Schneider, Munich, Germany. Five hundred colored drawings of historical costumes of different countries.

TRAPHAGEN, E. H. *Costume Design and Illustration.* John Wiley & Sons, Inc., New York.

See *National Geographic* magazines of the following dates for costumes of peoples of the world: Breton, September, 1910; Czechoslovakian, March, 1917; Dutch, December, 1910, and February, 1914; immigrants in national costumes, February, 1917; Hungarian, October, 1914; Russian, November, 1914; Italian, January and June, 1923; Mexican, September and December, 1910.

Textiles and color harmony. Every girl should be taught to appreciate fine textiles, to judge their quality, to know how various textiles are made, and to shop wisely. Small strips of the fabrics which are most commonly used for dress and in the home may be procured from local stores and mounted on large charts or in individual textile books. The full description and price may accompany the sample. One class illustrated different uses for each sample by mounting attractive colored magazine pictures on each page below the sample. Girls dressed in simple house dresses illustrated the use of gingham; girls in party dresses, the use of silk; while a child in its nightdress illustrated outing flannel; a well-set table, linen; and a little boy in a play suit, denim. At the close of this

project every girl had learned prices, quality, and uses of the more common materials.

In order that girls may study combinations and harmony of color in dress, small lengths of textiles of various colors should be accessible so that girls may be shown concretely what is and is not good taste in color combinations and also what colors are particularly becoming to their type. For practice in such lessons girls may be given outline figures on water-color paper to be painted according to good taste. Larger cardboard figures may be purchased and dressed with various colors of tissue paper. These often offer interesting means for experimentation in dress design.

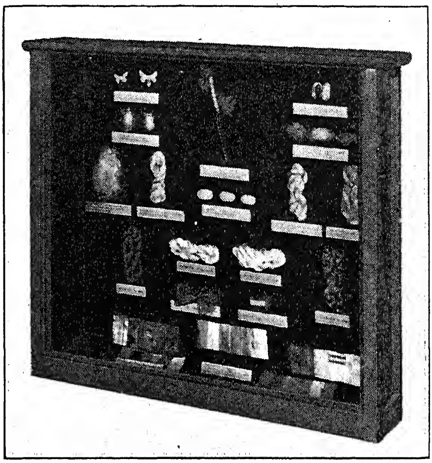


FIG. 140. An exhibit case showing the life history of the silk worm, and silk products

Courtesy of the Oakland Public Museum, Oakland, California

Along with this study should come the study of the sources of the textile industries, including a general knowledge of the growth, production, and manufacture of textile fibers, such as cotton, silk, linen, and wool. Visual aids here play an important part and form the basis for intelligent study. Exhibits of raw silk (Fig. 140), wool, cotton, and linen may be obtained from any mill or factory together with illustrated booklets. Excellent slides and stereographs may be purchased or borrowed from university visual-instruction bureaus of almost any state.

Likewise, good motion pictures of all these industries may be rented or borrowed from distributing bureaus or factories.

Home furnishing. This is emphasized in many home-economic courses. Every girl ought to know what constitutes a simple, artistic home and how to furnish one with the greatest economy. This can best be taught through visits to model rooms and through pictures of simple artistic rooms. Such pictures can be gathered from the *Good Housekeeping*, the *House Beautiful, House and Garden, Ladies Home Journal, Interior Decoration*, and from factories like the Armstrong Cork Company, Lancaster, Pennsylvania.[1]

Cooking. In the work with foods, flat pictures of model kitchens, correct clothing for kitchen wear, posters which explain food classifications, food values, correct table-setting, hygienic care and cooking of foods, present food facts to children as oral instruction can never do. Exhibits of many kinds are helpful and may be obtained from manufacturers for the asking. One of the many interesting exhibits obtainable shows wheat passing from the whole grain through the various processes of cleaning and manufacturing. Excursions to factories where food is prepared are often helpful. The absolute cleanliness of the up-to-date factories is certain to make a lasting impression.

Motion-picture films may be used to decided advantage in cooking classes. Films showing the growth and manufacture of most of the common foodstuffs are now available. Films treating of the industries of wheat, corn, salt,

[1] This company has published a most beautiful set of colored pictures of various rooms designed by a prominent interior decorator, and these can be obtained by any school. Excellent pictures of period furniture may be obtained from the *Mentor*, published by the Crowell Publishing Company. A good reference work is Eberlein and McClure's *Practical Book of Period Furniture* (J. B. Lippincott Company).

sugar, soap, glass, silverware, pottery, and many others are valuable if they can be used at the right time when interest is keen. (See classified list in Appendix A.)

Manual arts. Although the major part of work in the manual arts involves actual experiences in construction and manipulation, the work may be greatly enriched by the use in the classroom of pictorial charts, slides, and films.

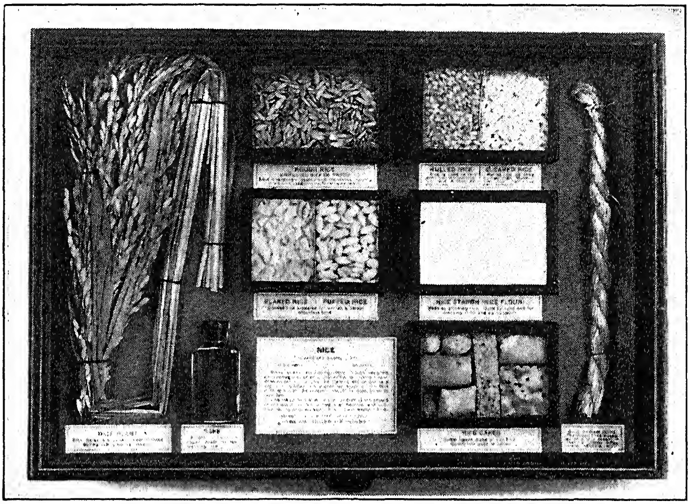


FIG. 141. A valuable exhibit of rice for any cooking class

One manual-training instructor had a series of slides made showing how to use the common workshop tools, such as the plane. The negatives were taken by the instructor and the slides made by a local photographer. These slides were used with all beginning classes and proved very helpful. (See Fig. 142.)

Another instructor used pictorial charts of various tools. These were displayed as the need arose. For example, before using a saw, the instructor gave an illustrated talk on the common saws and their specific uses.

The motion picture also shows concretely how the work of the world is done. It is not always possible to visit special shops and factories to gain first-hand information, but through the motion picture, large groups at a time may study definitely all the details of the manufacture of tables, chairs, and automobiles. The operation of the completed automobile can be shown by means of slow-motion diagrammatic pictures.

There is hardly an industry worth studying that is not well portrayed by a motion picture which can be used to advantage in the secondary schools. Students may visit great coal, iron, or gold mines, iron, steel or lumber mills, and boot, shoe, glass, or automobile factories. They may study every step in the development of electricity from Franklin's kite experiment, Edison's incandescent lamp, and the making of the first electric battery to the manufacture of a 50,000 horse-power, steam turbine generator, the largest single power-producing unit in the world. Shop instructors who neglect to use this valuable material, most of which is circulated free, have failed to meet an important responsibility.

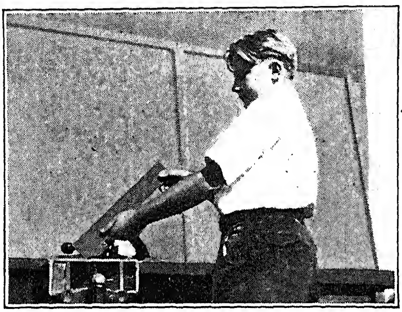


FIG. 142. A sample of slides showing how to use the common tools of the workshop

Some of the most practical work in the use of visual aids for manual training has been accomplished in a Newark, New Jersey, school. For example, the boys of a certain manual-training class were studying woods and kinds of lumber which were suitable for their shop work.

As the discussion proceeded, just at the psychological time, the instructor asked to have a few window shades drawn while he opened a little cabinet in the wall, took out his portable motion-picture machine, which was already threaded, connected it with the floor plug, and continued the discussion by projecting a film on the lumber industry. The boys sat in a group on the floor, and discussed with the teacher every point in the film. Occasionally the film was stopped so that certain steps could be viewed for a longer time. It took less than sixteen minutes to give this interesting lesson, yet in what other way could such concrete knowledge have been gained at that particular time by those school boys? It was noticed that such demonstration lessons were frequent in this particular class, and the instructor commented that he would hardly know how to conduct his work in manual training without the use of films. For classified list of films see Appendixes A and B.

HEALTH EDUCATION

Importance of health education. The public school is the chief single agency responsible for the citizens that compose the community. The fact that 85 per cent of the American recruits for the World War were found to be physically defective, and the additional fact that statistics still show that "75 per cent of the school children of the United States have physical defects which are potentially or actually detrimental to health," make the problem of health education one of supreme importance.

Every healthy-minded citizen wants to be vigorously and joyously alive. The average home, however, has failed, in large measure, to establish the necessary health habits in its growing children, and this task is perforce being thrust upon the public school. A sound mind in a

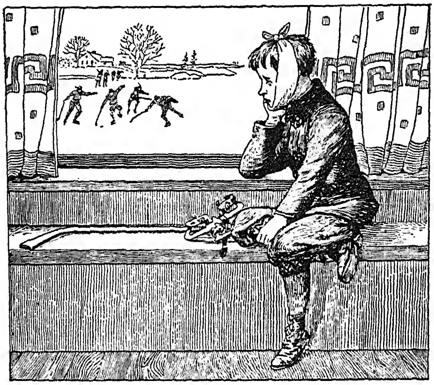


FIG. 143. Picture charts convey impressive lessons

James neglected his teeth

sound body has long been recognized as education's foremost purpose. For no matter how brilliant the mind, it cannot render its maximum service unless it is lodged in a strong, vigorous body. Therefore the public school, and particularly the elementary school, has gradually recognized that it has responsibility for developing sound bodies fully equal to its responsibility for developing healthy, intelligent minds.

Visual aids in health education. As in moral and civic education, health education must be directed through the emotions as well as the intellect. Dramatization and the use of appealing pictures furnish the most effective and impressive means. Talking and reading have little effect, as a rule, in actually changing established habits of living. But realistic pictures, full of dramatic action, and portraying vividly the results of

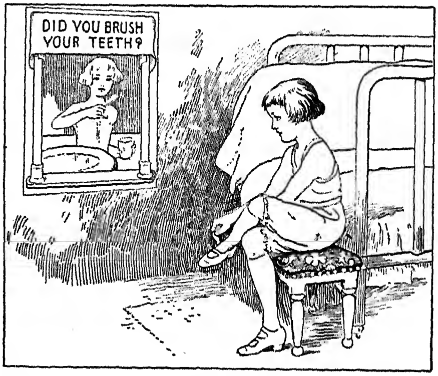


FIG. 144. This chart reminded Jane of a neglected health duty

indifference to simple health laws frequently make a sufficiently powerful appeal to the young mind to bring about the desired improvement in habits of health.

For example, when children see, in a film, Tommy Tucker, a careless, untidy boy with a row of ugly, decayed teeth, apply for a job and lose it because the employer will not hire a boy of his careless appearance and uncared-for teeth; and when they see that same Tommy, a year or so later, after he has been to the dentist and learned to care for his teeth and personal appearance, appear as a healthy-looking, efficient clerk, a deep impression is usually made on the mind of every child.

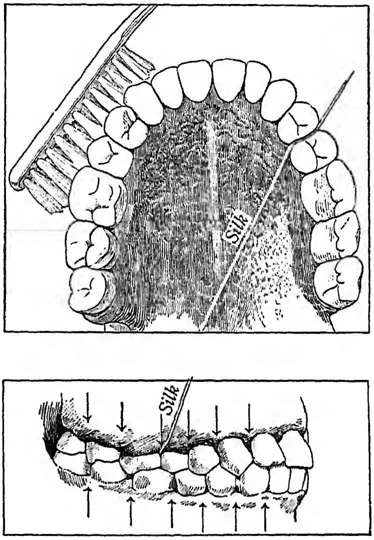


FIG. 145. Using dental floss between the teeth

The picture of a round-shouldered young man standing beside a tall, erect soldier may be accompanied by a catchy rime describing the results of poor posture. This will usually drive a valuable lesson home. With children, seeing is believing.

Health stories are most impressive when accompanied with large posters or stereopticon slides, and it has been noticed that teachers who make large use of this combined appeal are the ones that are accomplishing valuable results in health education. Health-teaching is at its best, of course, when correlated with other subjects of the curriculum, especially art, reading, and language.

The making of health posters is one of the most effective means of stimulating interest and really teaching the simple health laws. While searching magazines for appropriate pictures and creating their posters, the children are constantly thinking of a certain health lesson and how best to make the other members of their class realize the value of that particular health law.

One class that was carrying on a health campaign specialized on different poster lessons each week, and at the end of the campaign had a general exhibition of the best posters. This work was correlated with art, language, and reading, and stimulated decided interest in creative design and original verses and slogans.

These pictorial posters involved the following lessons:

1. What to eat and how to eat
   A healthful breakfast, lunch, and dinner for growing children
2. Need of fresh air in school and home
   Sleeping with windows wide open
3. Care of the teeth (see Figs. 143, 144, 145).
   How and when to brush the teeth
   Need of frequent visits to the dentist
4. Bathing
5. Care of hair, hands, and nails
6. Posture: sitting, standing, and walking
7. Care of eyes
   Need of light for study and reading
8. Care of nose
   Use of handkerchief
9. Care of feet
10. Healthful exercises
    Swimming, skating, dancing, games, etc.
11. Need of sleep and rest
12. Sanitation of home, school, and street

In dramatizing health lessons, the children may be spectacularly dressed to impersonate vegetables they should

eat, milk and water they should drink, or coffee and tea they should *not* drink; and their fellow pupils will listen attentively and thoughtfully to rhythmic verses which relate the logical reasons of why and why not.

The motion picture is one of the most valuable means the public school has for conveying impressive health lessons. When the lesson is interwoven with an interesting story, such as "Tommy Tucker's Tooth"[1] (Dental Educational Series), the teaching power of the film is of course increased. It is to be hoped that more motion pictures of this type will be available for school use in the near future. The picture is clean, wholesome, and interesting, and emphasizes every necessary lesson regarding the care of the teeth. It can be appreciated by first grade or sixth grade alike.

This brief discussion of the value of visual aids in health education will, it is hoped, stimulate the teacher to discover other ways and means of using these aids in their health training work.

READING AND LITERATURE

"Reading," says Herbert Spencer, "is the key which admits us to the whole world of thought and fancy and imagination. To the company of Saint and Sage, of the wisest and wittiest in their wisest and wittiest moments. It enables us to see with the keenest eyes, hear with the keenest ears, listen to the sweetest voice of all time. More than that, it annihilates time and space for us; it revives for us without a miracle the Age of Wonder, endowing us with the shoes of swiftness and the cap of darkness, so that we walk invisible like fern-seed."

By its tremendous enrichment of the child's experiences, abundant reading of a wholesome type more than justifies

[1] Purchased from the Deaner Institute, Kansas City, Missouri.

the prominent place accorded it in every school curriculum. But, in addition, the study of good literature uplifts and socializes: reading thus becomes a means for continued intellectual and spiritual growth. Fiction, particularly, offers unlimited possibilities for increasing a child's sympathetic insight into contemporary civilization, and a large use of appropriate literature has become a necessary supplement to the teaching of geography, history, civics, and nature study. For a deep emotional appeal permeates all literature, an appeal that is strong enough to lift the veil of unreality and abstractness and give pupils correct ideas of the life of the social and the natural world. Such stories as *Little Women* or *Mrs. Wiggs of the Cabbage Patch* make deep impressions regarding types of home life. A story like *Robinson Crusoe* depicts the advance of civilized man from the primitive state and the interdependence of civilized beings.

In the light of the broad and far-reaching benefits to be gained, the primary aim in teaching reading and literature is the establishment of the reading habit, and the second step is the development of a genuine love for and an appreciation of good literature.

Value of visual aids in teaching literature. As in the study of geography and history, so in literature pupils must visit in imagination many scenes which they have never beheld. The majority of children know only the small world of their immediate environment, and thus their experiences are very limited.

Their ability to form new mental pictures of distant lands, and to project themselves into the civilizations of other peoples, past and present, depends largely upon the fund of images and concepts which they have built up through contact with their home environment.

It is only through imagination combined with sympathy that students can hope to appreciate the point of view, enter into the feelings, or understand the motives and character of the individuals portrayed. Ability to interpret the thought and catch the spirit of any literary selection depends largely on the extent of past experiences in which certain definite mental images have been formed. It is the duty of teachers, then, first to make sure that children have an adequate background for comprehending and appreciating the geographic settings and historic allusions of the selections to be studied. Furthermore, in order that the child may appreciate all those fine things which literature instills and understand the interpretation of life which it offers, the teacher must devise ways and means to bring it within the child's comprehension.

For example, many stories and bits of literature offer the child a knowledge and an appreciation of the life and the ways of thinking of the people of Alaska. The stories must be approached, however, through concrete materials. First let the children handle and study some of the carved Alaskan fishhooks; then give the story of the great Tlinkit hero, Kayak, whose early home was supposed to be at the mouth of the Indian River in Sitka. Kayak was the possessor of a charmed fishhook, which brought him much good fortune, and he it was who taught the people to put carving on their fishhooks and household utensils in order that they might have greater good fortune. Again, by beginning with the small Raven totem, the children's minds are prepared for the legend of creation. Through these concrete approaches, Alaska becomes a land of absorbing interest and romance, and self-directing energy is aroused which will lead the children to search out and read with pleasure many of the fine things which will interpret Alaska. Such selections as "Kayak, the Tlinkit

Hero," "The Story of Creation," "The Chilkat Blanket," and "The Kit Canoe" will be read with appreciation. Such illustrative material as totems (see Fig. 146), carved fishhooks, cooking utensils, and a Chilkat blanket may be had from almost any curio shop.

Kipling presents a rare field of interest and joy for the children of the third grade and beyond, but the stories will mean much more if access can be had to pictures of the people, the scenes, and the animals with which the story is concerned. Kipling showed his realization of the advantage of this visual appeal by accompanying his stories with pictures which he himself drew. How comparatively little will the story of "The Elephant's Child" be enjoyed by the pupil who has never even seen a picture of an ostrich, a crocodile, a giraffe, or the "broader aunt," a hippopotamus. If it is impossible for pupils to have actual contact with the objects themselves which are essential to an understanding of stories and literary selections, provision must be made at least for helping them through the use of various visual aids. Through this approach, the imagination of the child is freed from the struggle to visualize the images which are suggested by the story of the selections being studied.

FIG. 146. The Raven totem pole, Wrangell, Alaska

Unless there is correct visualization, however, the beauty, the pathos, and the humor of the selection may be lost.

The efforts of children to read and enjoy The Arabian Nights are greatly helped by a knowledge of the Arabian, Egyptian, Indian, and Persian scenes which constitute the background and setting of these stories, so rich in their power to reveal the Oriental life, manners, customs, and spirit. Stereographs and well-illustrated books, particularly those with colored illustrations, are the best sources for these visual aids.

Another literary selection much used, the enjoyment and benefit of which is greatly enhanced by a proper use of visual materials in connection with its study, is "Hiawatha." It requires contact, however, with photographs and stereographs, of scenes bringing out the Indian life, tools, manners, customs, and so on. Ordinarily, it is easy to secure Indian relics and products of their civilization from museums and curio stores.

An acquaintance with literary materials such as those suggested above is an indispensable equipment of the children. Their interest in these stories results in free expression and interesting conversations, and the visual aids make a large contribution to possible clarity and intimacy of understanding. Whatever the story or selection may be, there should be at hand enough pictures, stereographs, concrete materials of whatever kind may be needed to enable the children to grasp concretely the thought expressed. Little progress can be made in reading such primary stories as the "Japanese Twins" or the "French Twins" by Lucy Fitch Perkins, unless sufficient use has been made of appropriate visual aids to enable the children to image clearly the many strange scenes and situations the stories present (Fig. 147). The teacher who appreciates the need for providing the proper visual

background will find available a wealth of materials in the form of exhibits, slides, and stereographs.

The film also is destined to become a valuable visual aid in the teaching of literature. Through its medium the historical drama, pageants, and stories may become actual living experiences. It is physically impossible to place upon any legitimate stage scenery which will portray to any considerable extent the historical verisimilitude which can be provided by the moving picture. On the screen we see cities, great stretches of country, and hundreds of people photographed in living situations.

FIG. 147. The jinrikisha of Japan

The use of one or two such pictures a day enables pupils to form a clear idea of many strange scenes and situations

The successful production of pictures such as "Julius Cæsar," "Robin Hood," or "Ben Hur" has clearly demonstrated the possibilities of the motion picture in the field of literature. The picturization of the lives of noted authors, such as Longfellow, Whittier, or Bryant, have also been used to advantage in the upper grades.

Limitations of visual aids. It should be borne in mind, however, that no picture can take the place of some of the world's great stories and literary gems. Certain word pictures painted by poets and other literary artists are beyond the reach of mechanical visual interpretation. Therefore, great caution should be exercised in showing films which

attempt the picturization of certain masterpieces of literature. Even though the text has been adhered to closely, the imagination is checked and various mental impressions and concepts which are sacred to each of us may be shattered. The beauty of Shakespeare, for instance, lies in the power of the spoken word. Reading some literature is like listening to music; we may read favorite selections over and over again with renewed charm. The phonograph and the radio will never entirely supplant the human voice and the opera, nor will the motion picture ever banish the spoken drama. There is a fascinating charm in the human voice and personal contact. They please both eye and ear.

Discretion should be exercised, then, as to what is picturized on the screen. Thus far efforts to film such poems as "The Barefoot Boy" and "Maud Muller," for instance, seem to be woeful failures, whereas the film of "Paul Revere," which is filled with dramatic action, has found much favor. All literary films should be carefully previewed by the teacher and inaccuracies checked before showing them to a class.

The following suggestions and examples may prove helpful:

1. The picture, as was stated previously, makes reading a real experience to the child of the primary grades. It stimulates interest and a desire to know more of the pictured situation through further reading.

Many efficient teachers introduce reading by the use of a series of charts containing bright-colored pictures showing life and action that are of interest to the children. These charts are made of large mounting cardboard or heavy wrapping paper on which are pasted pictures cut out of magazines. The story may be printed on the bottom of the chart or on separate slips of heavy paper, or, even

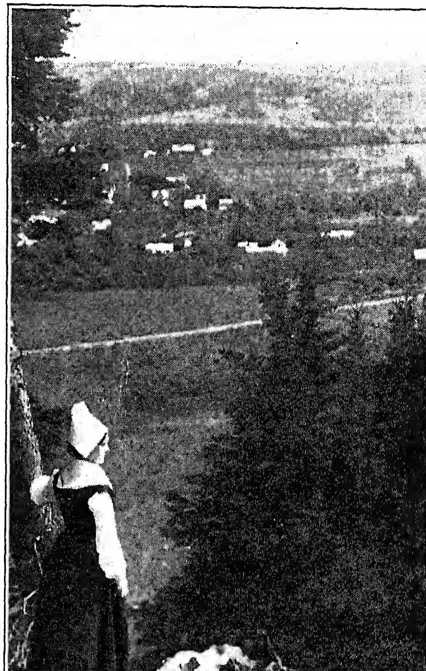
better, printed or written on the blackboard by the teacher as the pupils and teacher work out the story together. It is very helpful to have drill charts accompany these reading charts. These consist of large pieces of mounting paper containing just the picture of the single object taken out of the picture chart with its word symbol printed under it; as, a picture of a baby and the word printed under it.

Stereographs and accompanying slides may also be used effectively for children beginning to read who are not yet ready for the primer.

2. In the upper grades the study of a few pictures before a selection is read is likely to arouse interest and pave the way for future appreciation. For example, a few stereopticon slides of the battle of Gettysburg and of the battlefield as it is today, shown while the teacher gives a brief explanation, may stimulate a true interest in Lincoln's Gettysburg speech. It will also add to and prolong the interest of the class if the picture portraying Lincoln delivering that famous address at the dedication of the National Cemetery on Seminary Ridge on November 19, 1863, can be thrown on the screen while the selection is being read aloud. Such slides may be purchased or made from flat pictures. Excellent flat pictures of the life of Lincoln may be obtained for about ten cents each from the motion-picture distributors who handle Rockett's "Abraham Lincoln."

3. "Evangeline" may be visualized. During the detailed study of "Evangeline" one group of eighth-grade pupils made the work more concrete and interesting by attempting to picturize certain selections in various ways. Each pupil made a booklet in which various descriptive phrases were illustrated either by artistic drawings or pictures obtained from magazines and other sources. Some of these were "the

forest primeval," "thatched were the roofs," "Anon from the belfry softly the Angelus sounded," "dormer-windows," "Reverend walked he among them," "Gabriel's home in the Michigan forest," "Sweet was her breath as the breath of kine that feed in the meadows," "Bent, but not broken, by age was the form of the notary public," "Bursting with hay were the barns."



© Keystone View Co.

FIG. 148. Evangeline, overlooking Grand Pré valley

Such a picture gives a geographic setting for a better appreciation of the story

As another project, each pupil chose a selection which he wished to illustrate concretely. In carrying out this idea pupils constructed various realistic scenes in the form of "pin-a-poppet" shows. As one looked through a small peephole one could see vivid scenes of the village of Grand Pré, with its quaint houses and inhabitants, Evangeline's home, Basil's blacksmith shop, the signing of the marriage contract, the embarkment of Basil, Gabriel, and others, the burning of Grand Pré, Evangeline's wanderings in search of Gabriel, Evangeline going to the almshouse to minister to the sick, and the death of Gabriel.

Some of the girls took particular delight in dressing average-sized dolls to represent the various characters, such as Evangeline, Gabriel, Benedict Bellefontaine, Basil, Father Felician, and so on. This work was done principally in the sewing class, and the dolls remain as a permanent exhibit of the school. Frequent dramatization was also participated in during this interesting study. It was quite evident that such concrete procedure greatly increased the opportunities for deep and lasting appreciation of the great beauty of verse and thought in this masterpiece. The teacher declared that no such results had ever before been gained.

4. In another school splendid results were gained by the use of a set of stereopticon slides while a class was studying "The Lady of the Lake." As pictures were thrown upon the screen pupils were called on to explain their significance and to read the descriptive lines that related to the scene portrayed. It was surprising to see how these colored slides made every character and scene real and significant to these eighth-grade boys and girls, and demonstrated the power that lies in visual aids. The whole recitation seemed to be permeated with a sense of happy appreciation on the part of both teacher and pupils. Eye and ear were working coöperatively to bring about a happy situation.

Other suggestions regarding the use of pictures in teaching literature have been emphasized in other chapters. (See pages 317–318 for the use of poetry and masterpieces in art in teaching nature study.)

Summary. The use of visual instruction in teaching literature should enrich the experience of the pupil, substitute concrete images for indefinite ones, and furnish new backgrounds for future comparisons. Such concrete teaching demands much forethought and planning on the

part of the teacher, but the effective results more than justify the extra time and energy expended.

Teachers can secure a limited amount of suitable picture material from illustrated magazines, books, and from commercial houses dealing in flat pictures. See list on page 427 of Appendix.

The following magazine articles may be helpful to teachers of literature:

HOWARD, CLAUDE. "The Use of Pictures in Teaching Literature," *English Journal* (October, 1916), Vol. V, pp. 539–543.

WAKEFIELD, ETHEL. "Teaching Literature with Films and Slides," *Visual Education* (January, 1923), Vol. IV, pp. 4–6.

WARD, CORNELIA CARHART. "The Use of Pictures in Teaching Literature," *English Journal* (April, 1917), Vol. VI, pp. 267–269.

PART III. ADMINISTRATIVE PROBLEMS OF VISUAL INSTRUCTION IN THE PUBLIC SCHOOLS

CHAPTER VIII

THE NEED OF TEACHER-TRAINING IN VISUAL INSTRUCTION

Four fundamental problems will be briefly treated in considering the training of teachers in the field of visual instruction. (1) Why should capable teachers need special training in visual instruction? (2) Who should be trained in the technique of visual instruction in the public schools? (3) How should teachers be trained in this new field? (4) What should be the content of this training?

Why should capable teachers need special training? In order that any procedure may function properly in an organized institution all hindrances should be eliminated. The effective functioning of visual procedures depends very largely upon the personality, the training, and the attitude of the teacher toward visual instruction. Wholehearted and enthusiastic recognition of the need for it in the schools, and the ability to use it judiciously and effectively are indispensable. No industrial or commercial institution would think of introducing new equipment into its plant without thoroughly training the employees in its correct use. The same principle holds true when teachers confront the use of new educational techniques.

Visual instruction, as interpreted today, is comparatively a new problem in education, and, as we have seen, involves the care and use of new and more or less complex materials and apparatus. Like other equipment, these materials must be appreciated and understood before

they can be handled effectively. In teaching geography or history the majority of teachers are trained to use textbooks and subject matter as such, and not such tools as objective materials and projection apparatus. Moreover, the average teacher already in service does not have many opportunities to learn newer and better methods of teaching unless ways and means are provided by administrators and supervisors.

Recently an intelligent teacher of a large city school system happened to be guided into a summer session course in visual instruction. At the end of the second week she said to the instructor, "I have had a wonderful awakening. I have taught for many years and have always enjoyed my work and thought I knew how to teach school, but this summer I have found that I have been educationally dead for many years. I had no idea that such progress had been made in the last few years and that there were such interesting inspirational ways of presenting subject matter to children." This teacher had personality and a will to do, but, somehow, the newer and better ways of doing things had not penetrated into the environment in which she had worked.

It is therefore essential, first of all, to give teachers the opportunity to acquaint themselves with these new methods. These opportunities should be made possible within each school system, since it is often impossible for teachers to undertake university-extension courses while actually engaged in teaching.

More urgent than the spread of visual instruction, however, is the supervision of procedures already in practice. Many schools throughout the country are well equipped with visual materials and apparatus, but they are used in a haphazard fashion and with little knowledge of any definite technique governing their employment. The

finest tool is worthless if placed in unskilled hands. Its effective use depends upon the skill of the operator. A teacher who had recently become interested in visual instruction was endeavoring to use its materials in a sixth-grade recitation on Alaska. Hooked on wires running around three sides of the room was a great panorama of pictures — two full rows, an inartistic, conglomerated mass of color and form! The observer was reminded of a hideous London omnibus covered with all sorts of gay signs which so obscure the destination label that the poor traveler knows not whether the bus is going or coming. It was a wonderful collection of excellent pictures, but the teacher had not the slightest idea how to use them pedagogically in a teaching situation.

This fact was further emphasized when the class went to the projection room for the slide recitation. The work was unorganized, discipline was poor, and the lesson dragged out for an hour. The children were given no motive for the lesson, as there was no definite problem to be solved. There was merely a presentation of a great number of slides and opaque pictures, while the pupils talked briefly about the pictures instead of using a few of them to illustrate points under discussion.

Entirely too many pictures were presented in one lesson, and the lesson was continued far beyond the interest span of the group. Pictures were there in abundance, yet because they were misused and lacked quality they added little interest or life to the lesson.

No visual aid, not even a beautifully colored slide or a superior film, can possibly bring about effective educational results if used contrary to the principles of good pedagogy.

Even the simpler visual aids are often not appreciated and used as they should be. In dozens of schools are

cabinets of stereographs that are rarely used or only used by two or three teachers in the building, simply because the majority of teachers have not been trained to know their value as a teaching aid. County librarians complain that only a small percentage of the teachers in their districts call for either their flat pictures or stereographs. The reason given is that teachers do not seem to know how to use the stereograph in the classroom. They often look upon the device as a means of entertainment only, and use it frequently to keep children out of mischief while the teachers are busy with other classes. It is evident that all teachers, whether preparing for or already in the service, need definite training in the use of visual instruction since it involves entirely new problems in education.

Who should be trained in the technique of visual instruction in the public schools? Every progressive educator who holds either a teaching or an administrative position ought to have an intelligent comprehension of the major difficulties involved in this important problem in life and in education, — visual instruction in the public schools.

The time has passed when any teacher or educational administrator can sit back and rest, assuming that he has mastered all the problems of modern education. Just as theories and methods in physical or mechanical science are discarded as a result of more modern discoveries and inventions, so educational theories and processes become antiquated and new ones must be thought out.

As has been stated, schools all over the country are spending vast sums of money for visual equipment. They are buying the tools, but are making little provision for training teachers in their use. It is reported that in one large school system forty almost new motion-picture projectors are lying idle in the various school buildings. In this particular city there was no head to guide the work.

Films were scarce and hard to get, and teachers became discouraged with the plan of circuiting miscellaneous films, which they had no chance to select or preview. The outlay in this school system for the equipment alone could not have been less than nine thousand dollars. This, obviously, was an extravagant misuse of school money. If that school system had invested the same amount of money in a small library of slides and stereographs and had held some efficient individual responsible for their care and use, how much more would have been gained! As it is, the administrators and the majority of teachers of that system have become indifferent to the whole matter. Many similar cases could be quoted where serious mistakes have been made as a result of the administrators' being carried away on a wave of enthusiasm and not thinking through the whole problem before taking the first step.

In order that visual instruction may function educationally it is practically necessary that principals and supervisors as well as teachers be trained, particularly in the proper technique for the use of visual materials. It will surely bring about greater efficiency in every department when such training is required of all primary and secondary supervisors for both the city school and the rural one. It is a serious matter, and seems almost pathetic, when a primary supervisor confesses at this stage of progress in visual instruction, that he greatly believes in its use but as yet has not had time to learn much about it. It is an equally serious matter when progressive teachers who have had the ambition to take courses in visual instruction complain that they find it difficult to make progress in their particular school because they get so little coöperation from principals who have not taken the time to investigate the subject.

If more administrators and supervisors had a clear conception of the educational needs and uses of visual materials, the training of the classroom teacher would naturally follow, and her task would be greatly simplified. For administrators would then feel the need of providing suitable visual materials and of offering adequate opportunities for teacher training. This does not mean that administrators should become experts in this field — that would be impracticable; but they should thoroughly understand the need of and the best pedagogical technique for using such tools in all teaching situations. Educators are greatly concerned in the choice of textbooks and their use in the classroom; yet the choice of the quality and subject matter of slides and motion pictures, which may be capable of wielding a far greater influence for good or evil over the minds of young children, is often left to unskilled hands, and even to laymen who do not understand public-school needs.

How should teachers be trained? The problem that concerns the school at the present time is the training of the teachers and supervisors who are already in the service. The solution of the problem has already been covered somewhat in a previous chapter.

The classroom teacher is the one most closely concerned in this whole problem; she actually handles the material and works with the children, and it is imperative that she be master of the correct technique. It must be more than theory with her; it must be actual practice day after day. It is to be remembered by administrators that the classroom teacher is often overworked, and that it is no easy task for her to undertake outside extracurriculum work. This extra but necessary training should therefore be made simple and interesting; and all possible coöperation should be shown the teacher during her training.

A few suggestions as to plans that have been used successfully are given below.

1. General instructional classes may be held by the educational head of a visual-instruction department. Classes may be held once a week at least for five or six weeks, and attendance on the part of teachers should be optional.

Classes should consist of lectures and demonstration lessons in the use of visual materials.

2. General training for rural schools may be gained through conferences with the rural supervisor and through annual institute lectures and section work.

County institutes would be far more beneficial to teachers if there were fewer instructors and the attention was concentrated on two or three educational problems during each session. No institute instructor can possibly develop a problem of any value in one or even two lectures. If a definite procedure is outlined for a whole week of concrete work along special lines, much more can be accomplished. For example, the morning sessions, when minds are alert, could be devoted to section meetings where teachers could participate by groups in a week's course of study dealing with, say, two definite problems, such as educational measurements and visual instruction or modern methods of teaching reading and literature and the new point of view in teaching geography.

Two instructors, then, each representing one of these fields, could meet each of two or three groups every morning. The visual-education instructor could meet the primary group at 9 A.M., the intermediate group at 10 A.M., and the high-school group at 11 A.M. The instructor in educational measurements could meet the intermediate section at 9 A.M., the high-school section at 10 A.M., and primary at 11 A.M., and so on. In a five-hour course there

could be built up a background at least for thought and future study. Moreover, many teachers might be stimulated to take more comprehensive courses during summer sessions at teachers' colleges and universities. The afternoons are left free for general sessions, where inspirational speakers may lecture on topics of common interest.

3. As new problems arise in educational procedure teacher-training institutions must make adequate provision for handling such problems. Within the last few years teachers' colleges and universities have added such courses as vocational education, Americanization, moral education, educational tests and measurements; many others are to be noted in the announcements of courses.

The need for training teachers in the problems of visual instruction has already been recognized by a few outstanding institutions scattered from coast to coast. According to the United States Bureau of Education Report of 1924, eight of the twenty leading institutions having visual-instruction departments, or four fifths of them, also gave courses in visual education. This was a remarkable development in the short time visual-instruction departments had been organized. It was further stated that the courses greatly varied in content. The time devoted to such courses seemed to vary from six to eighteen weeks. In a later report[1] it is stated that twenty-three universities and colleges offered courses in visual instruction. In only nine of the twenty-three institutions were the courses given under the direction of the school of education; seven were offered under the department of agricultural education and were probably not intended to meet the needs of the classroom teacher.[2] It seems evident that there is a

[1] *Visual Education Directory of 1924*, compiled by the Secretary of the National Academy of Visual Instruction.

[2] It is estimated that about fifty colleges and universities offered courses in visual instruction during the years 1927 and 1928.

need for two types of training — one to train students who are preparing for the teaching profession, and another to meet the needs of teachers who are already in the service.

A brief account of the way one college handled the problem of teacher-training may be helpful to readers. In 1922, in an attempt to provide the training needed, the San Francisco State Teachers College introduced a full-credit visual-instruction course primarily for teachers in the San Francisco Bay region. The guiding objectives were two: (1) to present good practical methods of using visual materials, and (2) to encourage and aid schools and school systems in securing suitable equipment for a larger and more systematic use of visual instruction.

Courses were offered after school and on Saturday morning. The appreciative response from the teachers about the Bay region proved that a real need existed. In the first Saturday morning course there were enrolled five city-school principals, one supervisor, two high-school teachers, fifteen junior-high-school teachers, and twenty elementary-classroom teachers. In the complete enrollment there were represented six different school systems and twenty-seven different school buildings.

The courses offered two types of work. The leading course, given at the Teachers College, consisted of lectures, concrete demonstrations of the uses of all visual materials, reports of progress on individual problems, and laboratory work. In the lectures, the topics discussed covered the need of improving and enriching classroom teaching; fundamental reasons underlying the uses of visual instruction; practical pedagogical methods of procedure in the classroom; special uses and sources of supply of visual aids, such as flat pictures, charts, maps, globes, graphs, stereographs, slides, motion pictures; care and use of apparatus; how to start a distributing center; how to

equip schools for visual instruction; and ways and means of earning money for equipment.

In the demonstration work, typical lessons were presented either by the instructor or by members of the group. The aim was to illustrate how class work was developed and enriched through the use of visual aids by the children, as needs arose. The illustrative lessons were drawn from geography, history, current events, nature study, health, and safety. This feature was probably the most helpful part of the course, since it showed concretely what the members in the class were actually accomplishing in their regular classroom under the influence of the course offered.

The second type of work presented in the courses was field work. Upon request, the instructor visited principals and individual teachers in their schools and endeavored to give concrete help in solving the daily problems that appeared in the field of visual instruction. In the prosecution of this field work, twenty-one different schools about San Francisco Bay region were visited from one to four times. By the end of the year twelve of the twenty-one schools were fairly well equipped to carry on visual-instruction work, and three had started school libraries with a small visual nucleus. Every teacher, by the time she had finished her course, had accumulated a personal collection of well-mounted pictures, exhibits, charts, and graphs to use in enriching her own classroom teaching. The improvement in the atmosphere of the schoolrooms of these teachers was remarkable. The rooms became real living workshops with attractive illustrative material on the walls, on the library table, and in the cabinets. Boys and girls were beaming with interest and enthusiasm, because they were learning to solve real life problems in a natural, interesting way.

At the end of the first semester, as many teachers desired to continue the work, an advanced course was offered for those who had completed the beginners' course.

That year a summer-session course was also offered, and the second year a beginners' course was organized for the senior students in the college. It was found that students gained more from the course if they could accompany it with some practice teaching, thus making immediate application of the knowledge gained.

As the work developed, the University of California provided further opportunities for teachers in the San Francisco Bay region by offering extension courses in visual instruction in the cities of Berkeley and Oakland. These courses were given by the same instructor who started the work in the State Teachers College of San Francisco. Arrangements were made whereby the instructor could serve three days a week for one institution and two days a week for the other.

These courses have all been given in close relationship with the Department of Education; in fact, they are rated as courses in education, and full college credit is given for their completion.

What should be the content of this training? Instructors of visual instruction seem to agree that a beginners' course should treat three problems:

1. *The fundamental reasons and technique for using visual instruction in classroom teaching.* This involves the principles and procedure of modern pedagogy. For visual instruction particularly requires of the teacher an understanding of the psychological principles of modern classroom procedure. Every step in the technique of using visual aids is tied up with an actual teaching situation, where problems are to be solved and projects executed. A course in visual instruction must emphasize, therefore,

certain phases of modern pedagogy and the psychological principles on which they depend.

2. *The source of supply, the care, and the use of materials and apparatus.* Each visual aid should be dealt with separately. At least two or three periods of an hour each are required for an adequate study of each specific teaching tool, and then the work is only begun. Weeks or even months might be spent profitably in studying such problems as the pedagogical use and care of flat pictures, the use of maps and globes, the graphic chart as a visual aid, or the motion picture as a teaching device.

Ample opportunity should be given students during the course for practice in using visual materials and apparatus. This may be managed by arranging with special training-school classes for demonstration periods; or the teacher-training group may assume the attitude of a regular class, while various students participate in solving definite problems by using different illustrative materials and apparatus.

3. *Enrichment of curriculum by means of visual instruction.* The scope of this third problem is so extensive that it is almost necessary to incorporate it into an advanced course. It is almost impossible to do justice to any course in visual instruction in a thirty-six-hour course. In an eighteen-hour course an instructor is only able to discuss the most important points.

In an advanced course of thirty-six or fifty-four hours, several days may be devoted to each of the more important subjects of the curriculum, geography, history, or natural science. More time can then be allotted to special types of materials which are particularly adapted to certain subjects; for example, the graphic chart and the cartoon, in the teaching of history; the pictorial poster and the motion picture in "safety first" lessons.

In all types of courses, students should be furnished with a well-organized syllabus, and it is worth while to include in the syllabus an adequate bibliography on visual instruction in relation to modern pedagogy.

The specialist in the field of visual instruction will profit by short courses in photography, electricity, graph making, and so on.

Special courses in visual instruction can be greatly simplified and shortened if instructors in educational procedure in geography, history, and the like will include in their courses on methods the principles involved in the use of visual materials. This development is a logical step, and it is to be hoped that it will come in the near future.

CHAPTER IX

ORGANIZATION AND ADMINISTRATION OF A VISUAL-INSTRUCTION DEPARTMENT

The need of visual-instruction departments. As the foregoing chapters have brought out, visual instruction in the public schools involves handling and using many and various types of materials and apparatus. Some are simple and familiar to all teachers, but much of the material and apparatus is entirely new to the average educator.

It is self-evident that no constructive educational work in visual instruction can be carried on in any community, be it large or small, without some organized working plan, and some one person responsible for the functioning of such a plan. Otherwise the work is more or less of a hodgepodge, and too often the result is the promiscuous use, here and there, of a small amount of mediocre material, usually motion-picture films. These are either borrowed or rented from some distant exchange, and are often unsuited for teaching purposes. Little or no fundamental learning can possibly come from such procedure, and it really seems but a waste of time and money.

Many leading school systems have already foreseen this need of a definite educational policy and have established well-organized visual-instruction departments, which maintain excellent distributing centers. These operate much as libraries do, and materials are checked out and circulated like books.

According to a bulletin on "Visual Instruction Departments in Educational Institutions" issued by the United States Bureau of Education in 1924, fourteen progressive cities in the United States at that time had organized visual-instruction departments with full-time or part-time directors to guide the work. Two state departments of education, those of New York and Massachusetts, had long conducted efficient visual-instruction service bureaus. Besides these city and state departments, which aim directly to meet the needs and interests of boys and girls of the public schools, twenty state universities maintain visual-instruction departments. These university bureaus operate usually under the direction of the extension division, and serve schools, churches, and communities; therefore, much of their material must necessarily be adapted for adult use.

In thirteen of the fourteen city school systems possessing visual-instruction departments, the average annual expenditure was $11,692. The largest total budget for any one department was $31,600 (for the year 1924). Smaller city budgets ran as high as $5000, and up.

These data give a partial idea of the progress reached as far back as 1924. Since then many city departments of visual instruction have been organized in nearly every state in the Union, and several additional distributing centers are functioning through the state departments of education. Outside of these organized departments, thousands of schools all over the country are spending large sums of money for projection apparatus and for rental of films. These films are used more or less for mass education in large assembly halls where children of all ages are grouped together. This practice has led educators to raise the questions: Are fundamental results being gained? Is school money being wisely spent?

Economy and efficiency through organization. Centralized effort and intelligent organization in any undertaking always operates with greater efficiency than scattered efforts, and results in a saving of time and money. The development of visual instruction has reached a stage where organization on a business as well as on an educational basis is needed in order that all children may be adequately served with the minimum financial expenditure. Since visual materials, particularly stereopticon slides and motion pictures, are already being used in the public schools far and wide, there is great need that the work should be guided by trained leaders and that more suitable materials should be collected. The practical application of such visual aids is no longer an experiment; the pioneer stage has passed, and definite conclusions have been reached regarding both technique and distribution of materials.

A centralized bureau either in a state or in a community seems one of the first steps toward effective educational results. In the first place, such a bureau means economy. Every school needs a great variety of exhibits and pictures to make concrete the subject matter of various lessons, and much time and broad knowledge is required to collect suitable materials to be used for teaching purposes. Principals and teachers have neither the time nor, ordinarily, the training to do justice to this work, with the result that money is often wasted on poor materials. Where a central bureau is maintained by a school department, not only better visual material but also a greater variety may be purchased.

In the second place, where individual schools have attempted to collect for their own use material such as slides, stereographs, and exhibits, usually no one person is held responsible for its care and use, and as a result

slides are lost and broken, and pictures are never returned to their place. Nothing is ever to be found when it is really needed. Also, much material lies idle two thirds of the time. For instance, a set of slides on the history of Greece or a habitat-group case of the robin might be used for a week during one semester in a particular school and lie idle for the nineteen remaining weeks. This is a selfish expenditure of money. Those same visual aids, if handled by a central bureau, might bring help and joy to nineteen other classes in the city or state and at the end of the term be in far better condition than if they were allowed to lie unused in some principal's office. In a central bureau, too, material may be bought in quantity and standardized, which means that better quality may be secured at lower cost.

The status and administration of a visual-instruction department. It would seem to be of first concern to determine the status and importance of a department of visual instruction in relation to education in general, and to the other departments already functioning in a school system. Such a department is unique in itself, and is not comparable with any previously existing organization. It might be likened to a library or museum; yet here again it is different from these, if it functions effectively in a school system, since it must serve in an administrative as well as in a supervisory capacity.

In the first place, such a department must select, buy, and circulate large quantities of educational materials, which go into classrooms to be used by intelligent teachers in instructing children. These materials do not deal with only one subject of the curriculum; but the department must provide superior visual aids to meet the needs of every subject — history, geography, the natural and physical sciences, health, music, and art. It must supply

concrete help for every grade from the kindergarten to the last grade of the senior-high school.

In the second place, in order to function effectively, a department of visual instruction must be equipped to guide teachers in the pedagogical use of all the types of visual aids and apparatus which are sent out into the schools.

Such a department then must assume a dual responsibility: first, as a distribution center of visual materials, and, second, as an educational information bureau or, to phrase it differently, as a teacher-training bureau, in this particular field.

No other department outside of the superintendent's office has such broad and far-reaching duties and responsibilities. It is apart from, yet must coöperate closely with, every other administrative department of a system. This may seem like giving undue importance to this new department in education, but those who have labored for years in striving to bring visual instruction to a high plane of educational service fully realize its scope and importance in modern educational procedure.

It has been a regrettable fact that often through seeming necessity or through failure correctly to appraise their value, struggling visual-instruction departments have, like orphans, been attached to some already existing department such as agriculture, nature study, art, or the library. It stands to reason that, thus hampered and narrowed in their scope, they cannot, broadly and without bias, serve all fields of education. As A. P. Hollis says in his government report, "Visual Instruction departments generally have not been planned long in advance and usually have 'growed up,' Topsy like, from the interest of some individual instructor or extension worker."

When we stop to think what the proper use of visual material can do and is doing toward eradicating illiteracy

and educating the masses all over the world, lifting them to higher planes of living, besides bringing joy and meaning to school lessons for thousands of boys and girls, it seems high time that these departments be more justly appraised and definitely and intelligently planned for.

General duties of a director. After we have recognized the importance of a visual-instruction department and the responsibilities attached to it, let us next consider the duties and necessary qualifications of the head or director of such a department. The general duties of the director and staff of a visual-instruction department as outlined below are not theoretical, but have been actually performed.

1. Organization and general supervision of department and office help.
2. Making and spending the budget.
3. Consulting groups of teachers, principals, and supervisors regarding types of materials needed.
4. Selecting and buying all types of materials for all subjects in all grades.
5. Organizing and classifying materials for certain subject matter or problems.
6. Selecting and buying all types of apparatus needed, such as projectors, screens, etc.
7. Issuing bulletins regarding materials on hand, and their use in developing certain problems, and holding special meetings.
8. Holding teachers' meetings by grades to give general suggestions and to demonstrate how to use new apparatus and materials.
9. Planning and assisting in special demonstration lessons given by teachers and their children.
10. Compiling, with the coöperation of teachers, principals, and other administrators, a course of study or teachers' guide, which shall treat of the pedagogical use of visual materials and offer suggestions as to how materials may be used in different types of lessons in the various grades.[1]

[1] See Course of Study Monograph No. 7, University of California, Berkeley, California.

11. Supervising the organization and compilation of an annual catalogue.
12. Visiting schools to help teachers with special problems.
13. Giving advice and assistance to community clubs, and speaking before them.
14. Conducting special university or college courses in visual instruction once or twice a week after school hours. Teachers need the opportunity to take these courses, and full college credit should be given for them.
15. Supervising the preparation of the annual report to the superintendent of schools and the board of education.
16. Occasionally previewing motion-picture films, with groups of teachers, to determine suitable material.

Such a formidable list of duties may seem quite appalling to some readers, yet the performance of such service is necessary if the visual-instruction department is to function according to modern educational principles.

The duties of any department vary according to the size of the school system and the age of the department. As visual departments expand, the duties become most complex and much of the responsibility must be shared by capable assistants.

Qualifications of directors. The position of director of a visual-instruction department is a comparatively new one. There are fewer than two dozen such directors scattered throughout the United States today. These few leaders were pioneers in the work; they are self-trained. That is, for the most part, they are capable teachers who became interested in this new phase of education, seven, ten, and even twenty years ago. Through diligent study and experimentation they have set up certain criteria and ideals as a basis for procedure. Study and experimentation are still going on — the process is still in the making. One of these pioneers ventures to suggest briefly, in the light of her experience and her knowledge of modern

educational procedure, the qualifications that an efficient director of visual instruction should possess.

1. In light of the duties he must perform in a modern city or rural school system, above all else a director must be a scholar, with a broad knowledge of the *fundamental principles* of *modern education.* He must know subject matter and the technique of teaching.

2. Extensive teaching knowledge, and if possible actual experience in the grades and high school, seem equally desirable. A director must survey the whole field of education. He must buy and organize material for every subject and every grade. He must be able to instruct and coöperate with teachers all along the line. Imagine any one teacher, however expert in his own field, attempting to fill such a position! We need more visual material in the primary grades than in any other, and therefore a director must have a clear conception of primary education; but he must go further and possess a general working knowledge of junior-high-school and senior-high-school procedure.

3. Supervisory experience, since teachers often must be trained to use visual materials effectively, greatly aids a director, although adequate college training courses in school administration may make up somewhat for lack of such experience. However, the work is just that much harder if the director is not used to working with teachers.

4. A reasonable amount of business ability seems necessary. Economic and efficient organization and maintenance is one of the first requisites for any administrative department. In any visual-instruction department large sums of money must be spent judiciously. Office assistants must be trained to work economically. This is especially necessary because the field is too new to find such assistants already trained.

5. A thorough knowledge of the problem of visual instruction is essential. This qualification is of paramount importance.

It is only recently that a very few colleges and universities have been offering training in this new field. Heretofore directors were compelled to gain their knowledge of the problems of visual instruction through personal experience, through the process of trial and error. This is always a difficult and laborious process. Students of visual instruction now have the opportunity to profit by the years of experience of pioneer workers.

6. The head of a visual-instruction department must have the happy faculty of knowing how to coöperate with both supervisors and teachers. Since he is constantly called upon to confer with members of the business world, and to talk before community clubs, he must be able to meet the public with ease and confidence. Because of the scope of the work, it is a difficult position to fill. The wise director will be extremely tactful and work slowly and humbly. He will endeavor to inspire interest, and will offer suggestions, but he will never dictate.

With the foregoing duties and qualifications in mind, it seems quite unbelievable that intelligent superintendents and boards of education have often turned the whole problem over to a grade teacher, a supervisor of art or of nature study, a librarian, or, as has actually been the case, to a mechanic who, while thoroughly understanding how to operate a motion-picture projector, knew nothing regarding public-school education. These same superintendents will search the country over to find an expert for the manual training or research departments and offer creditable salaries for such service. Yet they are often willing to turn over the visual-instruction work, which

involves the expenditure of thousands of dollars and vitally concerns all children, to untrained hands! Such business principles are unknown outside the school.

The department staff. No administrator can hope to be an expert in performing all the duties of this department. A visual-instruction director is the educational head. He should have, however, a working knowledge of all the activities that concern his department. He must have a general knowledge of electricity, of the mechanism of projectors, the making of slides, and the assembling of exhibits, habitat groups, and so on, but it is entirely impossible and quite unnecessary for him to be an expert in any one of these things. No efficient director in a well-organized department has time for all these duties. It takes years of training and practice to become proficient in any one of them and such duties are ordinarily delegated to experts in each particular field. He must be sufficiently skilled, however, to be able to judge quality of workmanship and service. Specific duties must be delegated to efficient assistants.

1. *Mechanical expert.* Of first importance probably is a skilled mechanic, who assumes full responsibility for care and use of all projection apparatus which is used throughout the system. This is a heavy responsibility if the system is large, as machines must be constantly inspected and repaired. Electrical problems constantly arise that need an expert's attention. The care and use of films also fall to this assistant.

2. *Assistant and stenographer.* If the department is small, the duty of stenographer may be assumed by an efficient person who may act also as a general assistant to the director. It is of advantage if such an assistant has had some teaching experience, since she constantly meets teachers who come in seeking information regarding suit-

able materials for classroom work. The filing and cataloging of materials must necessarily fall to such an assistant in small departments. Likewise she must supervise the selection of materials in filling teachers' orders each day.

3. *Office helper.* As a department grows, a third assistant becomes necessary. Her time may be devoted primarily to mounting flat pictures, mending slides, binding booklets, and checking materials returned to the department.

4. *Delivery man.* Experience has taught that regular and prompt delivery of materials is of vital importance if the department is to function effectively. In our modern procedure, teachers cannot plan too far ahead for material. Unlooked-for needs arise daily, especially in the elementary grades. If a system is small, a daily service is quite possible, and needs can be met within a short time after they arise. It is not at all likely that every school in the system needs material every day. In any system provision should be made for at least two deliveries a week to each school.

If the department is new or small, it is often possible to hire a capable high-school or college boy with a car to work for several hours a day. The partial time of a regular school truck is, however, more satisfactory. Of course in large cities each department has its own special truck. It is quite unsatisfactory, however, to deliver visual materials on trucks carrying storeroom supplies. Exhibit cases, slides, and other breakable materials must be handled with special care, and one man should be held responsible for their delivery.

Miscellaneous. In large city school systems or in state departments, it is evident that duties multiply, and subdepartments with efficient heads must be organized from time to time. Some large cities have a film department,

a slide department, and an exhibit department. Others maintain photographic sections.

How to start and organize a department of visual instruction. Regardless of the size of a city or community, the organization of a department of visual instruction should be the outgrowth of a long-existing need felt by the teachers. Readiness must be there to insure hearty coöperation. Even then the development must proceed slowly and carefully, step by step following the clear vision of a well-thought-out plan. The following is a brief description of the beginning of a visual-instruction department in a city of some eighty thousand inhabitants.

For several years various schools in the public-school system of Berkeley, California, had been using visual materials such as stereographs, slides, and films along with the older types of visual aids, but, as in all systems, the material was too often ineffectually used by teachers and principals who had not thought seriously of the total needs and uses. So there was a growing desire on the part of many to see the work organized, guided, and encouraged. It was felt that before any quantity of new material and equipment was placed in the various schools, the teaching staff should be guided as to their proper use and application.

Accordingly, a committee was appointed in 1919 to formulate some sort of handbook or guide in the use of visual materials. The various members of the committee were chosen because they were specifically interested in some particular field of work. They were special supervisors, principals, and classroom teachers, and every phase of school work was represented. The entire first year was spent in studying, experimenting, and investigating methods and materials. The committee met regularly every two weeks.

During the second year the committee began to compile their findings in the form of a monograph. In this guide-book they attempted to give concrete help regarding available materials and to show how the use of these materials enriched all types of subject matter.

The committee also recommended to the board of education that a department of visual instruction be organized and that a budget of $4500 be appropriated for the purchase of visual materials and apparatus of various kinds.

A few months before the monograph appeared, a visual-instruction center was established which had a part-time director and an attendant in charge, so that by the time suitable material was ready for distribution, the course of study was in the hands of the teachers.

The following is a very brief outline of the procedure followed in organizing the visual-instruction center:

1. A room adjoining a small auditorium was set apart as the visual-instruction center. Shelves, cabinets, and drawers were built in to care for all types of materials to be used. A limited amount of office equipment was installed. The auditorium was used for meetings and projection purposes.

2. Materials such as slides and exhibits were gathered up from the various schools that would part with what they had. The school system owned some exhibit material. Two thousand excellent colored slides were loaned to the department by outsiders.

3. One portable motion-picture machine and two projection lanterns were purchased. All but two schools already owned opaque or slide lanterns, and several schools owned either professional or portable motion-picture projectors. A metal portable booth was made for use in showing inflammable films.

4. A small portion of the budget was set aside for rental of strictly teaching-films. Lists of suitable films had already been sent out by the committee and were referred to in the course of study.

Films were requested by teachers and sent out by special delivery as they were needed. A college boy with a delivery car was hired at the rate of one dollar per hour. At first he served one hour a day and then two hours as work developed. A department truck was secured later.

5. Dozens of letters were sent out to commercial and industrial firms requesting available visual materials. Many industrial exhibits came in as a result.

6. Several hundred copies of the *National Geographic Magazine* were either donated or purchased from the Red Cross shop and second-hand book stores. Colored pictures were carefully mounted and filed, and the sections of the magazines were rebound and filed separately.

7. As time permitted, stereopticon slides, flat pictures, and stereographs were carefully selected and purchased. Slides were gathered from various sources to correlate definitely with some particular subject matter or problem. Therefore both slides and stereographs were classified in small sets.

8. A fortunate arrangement was made with the Academy of Natural History at the Golden Gate Park, whereby their taxidermist would assemble habitat groups of birds and small animals of the state if the cases could be made in the manual-training department of the school. This resulted in the production of many exhibits of the finest quality and the most superior workmanship.

9. After the first month, one grade meeting was held for each grade to enlighten and instruct the teachers regarding use of materials. The course of study was discussed at these meetings, and suggestions were exchanged.

10. Principals were asked to coöperate by having some capable teacher in each building, preferably one who had served on the visual-instruction committee, selected as a visual-instruction adviser. These advisers met with the director for counsel regarding definite needs of buildings. They were also of great assistance in guiding the visual-instruction work in their various buildings.

The small department thus begun has developed and expanded in size and service during the years that have followed. Every year additional space has been required for the hundreds of new pictures and slides. The annual budget has averaged from $5000 to $6000.

The department, thus far, has not deemed it advisable to purchase films. First, such a purchase necessitates a great outlay of money, both for the films themselves and for vaults in which to store them. Second, the University of California distribution bureau is located in the same city. The special delivery man makes a daily trip to this bureau. Thus the needs are met without involving the care of the films.

Each school is allowed a certain annual budget for rental of films, and may order films through the center as the films are needed. Suggestions and new catalogues are sent out regularly.

Some years ago stereograph sets in cabinets were put in every elementary school so that emergency needs could be met during study periods. More complete sets are kept at the center and are usually used before or with slides in developing a problem.

As with a library, years are needed to accumulate carefully selected teaching materials. Many departments have been most fortunate in receiving valuable donations from individuals, clubs, chambers of commerce, railroad and steamship companies, and other sources.

The following is a copy of the first bulletin issued by the Berkeley department.

Bulletin No. 1

VISUAL-INSTRUCTION DEPARTMENT

To Principals and Teachers:

General Announcement. The Visual Instruction Center is open every afternoon from 1 to 5 o'clock, Tuesday morning from 8 to 12 o'clock, and Saturday morning from 9 to 12 o'clock.

Principals and teachers are invited to visit the center and look over the material on hand. Any slide may be previewed.

In addition to the regular visual material listed in the catalogue, teachers may borrow from the department a portable motion-picture projector, portable booth, and stereopticon lantern.

Teachers desiring to learn to operate any projector may do so by making a special appointment at the Visual Instruction Center. It is advised that each principal appoint one teacher in his school who may assume the responsibility as an adviser on visual-instruction. Will principals please send the name of the adviser to the center?

Film service. The department has not deemed it advisable to purchase motion picture films, but feels the truly instructional film is of such great value as a means of enriching subject matter and solving definite problems in regular classroom work, that a way has been provided whereby principals may rent a limited number of films as they are needed for definite instruction in individual classes. It is urged that no film be presented to a class until it has been previewed by the principal or teacher.

Arrangements have been made with the University of California Visual Instruction Department whereby films may be sent to your school early enough to be previewed before they are used in the classes.

Delivery service. For the present we are able to make deliveries to schools daily between the hours of 9 and 11 A.M.

Types of films. In compliance with our city ordinance, schools are reminded that only noninflammable films may be used in our portable machines without a booth. The university has

about eighty-seven motion pictures consisting of nearly one hundred reels on noninflammable stock.

Bookings. Principals may book films directly from the source of supply or may book through the Visual-Instruction Center. An actual check of all rented films must be kept at the center.

The university has but one copy of each subject and serves the whole state of California; so it is necessary to book special reels far ahead. This applies particularly to films pertaining to special holidays such as Columbus Day, Thanksgiving Day, Washington's Birthday, Lincoln's Birthday, and special educational weeks.

Special requisition blanks are furnished by our Visual Instruction Center.

Catalogue. An indexed catalogue of all materials which are ready for circulation has been sent to each school.

Rules Governing Service

In order that the Visual Instruction Center may serve the classroom teachers efficiently, it is found necessary to ask your coöperation in observing the following:

1. Requests for visual materials may be made over the telephone or in person any afternoon between the hours of 1 and 5 P.M. Requisition blanks properly filled out may be left in the Visual Instruction box at the superintendent's office.

2. Material from the center may be kept three days, but may be renewed for a longer time upon request.

3. Motion picture films are rented by the day and must be returned promptly. Do not rewind films, as they must be inspected.

4. Please have all material to be returned in good delivery condition in the principal's office before 9 A.M. so that no time will be wasted.

5. Slides are loaned in sets and are usually accompanied by a complete text. Before slides are returned, rearrange them according to numbers.

6. It seems necessary to ask the schools to be responsible for loss or breakage due to carelessness. Please do not put thumb tacks in flat pictures. The exhibits and slides should be handled with the greatest care. Kindly report any loss or breakage.

7. Visual aids should be used as other reference materials are used — when the need arises to solve definite problems or enrich new subject matter by means of bringing clear, correct concepts to the mind. Therefore, teachers should guard against the use of too many pictures at one time. Teachers are asked to study the Visual Instruction Monograph carefully, especially the chapters governing effective methods of using visual materials.

8. Please advise this department how it may best serve your needs.

The following is a suggestion as to the minimum operating equipment needed in starting a small distributing center. This is exclusive of teaching materials and assumes that a new department will at first only rent films.

Office equipment (outside of built-in shelves, drawers, and cabinets)

- 1 desk and chair.
- 1 long work table.
- 1 filing case for letters, cataloging cards, etc.
- 4 extra chairs.
- 1 typewriter.
- 1 typewriter desk and chair.
- 1 flat picture cabinet (open from top). (See Figs. 18 and 19.)
- 1 picture press.
- 1 paper-cutter.
- 1 stapling machine for books and bulletins.
- 1 large roll of wrapping paper on metal reel.
- ½ dozen balls of cord or heavy twine.
- 300 sheets of mounting paper for pictures (1500 pieces).
- 3 dozen paperoid expanding wallets for carrying pictures, size 14″ × 19″.
- 3 quart jars of good library paste. (It spoils in too large containers.)
- ½ dozen large soft paste brushes.
- 2 pairs long-blade scissors.

Slide equipment

- 1 stereopticon slide projector — 500 watt.
- 1 combination slide and post card projector (New Daylight model preferred).

1 Daylight screen and projector with tripod.
1 dozen extra electric-light globes for each projector.
1 dozen boxes of good quality cover glass (for mending slides).
1 dozen boxes thumb labels for numbering slides.
1 roll of lantern-slide gummed tape (for rebinding slides).
1 box of lantern-slide mats.
6 dozen wooden or heavy cardboard slide boxes (can be made to order).
6 dozen heavy buckle straps for slide boxes.

Stereograph boxes

6 dozen stereograph boxes, 25 cents each.

For motion-picture equipment

1 portable motion-picture machine.
1 screen for projection in room.
1 rewind set.
2 extra reels.
1 pint of film cement.
1 film-patching block.
1 piece of motion-picture film (for teaching how to thread a machine).
1 extra metal film-container.

CHAPTER X

CONCLUSION

It has been emphasized throughout this volume that we are living in an era which demands a new type of education. Each period in the progress of civilization brings forth new and better means of solving its social and economic problems; therefore, subject matter and methods of instruction must keep pace with this progress in order to be adapted always to the specific needs of contemporary living.

In the past, too much stress has been placed upon the reciting of words. Too frequently teachers have not probed behind the spoken word to discover to what extent genuine learning has taken place. Far too much has been taken for granted. Pupils have memorized but not understood. The heavy dependence of teachers upon the printed page of the textbook has contributed to the fallacy that "lesson-learning is education." Modern society demands that present-day education shall be more concrete and practical and that due consideration shall be given to the use of the more modern methods and equipment which the social and business world have found to be necessary and which have indeed become a part of life itself.

As educators have become convinced that because of the greater vividness of the imagery stimulated, the retention of the ideas presented by visual means is usually more permanent, visual instruction is taking its legitimate place in public-school education the world over.

This volume has also stressed the fact that thus far visual instruction has been rather poorly handled in the schools generally, that the value of the motion picture has been overestimated, and that the motion picture is used somewhat indiscriminately, often as a substitute for, rather than supplementary to, other means of instruction. If visual instruction is to succeed as a vital factor in the teaching process, the pedagogical use of visual aids must be studied. The circuit system of motion pictures, regardless of curriculum organization, should be eliminated. Educators must discriminate between entertainment and careful learning.

It has been pointed out that because of the size and definiteness of the screen picture, it matters not whether a slide or motion picture is viewed by ten or four hundred individuals. Whether any actual learning takes place depends entirely upon the type of subject matter and the preparation of the pupils to understand and appreciate the content of the screen lesson.

LOOKING TOWARD THE FUTURE

The outlook for visual instruction as a dynamic factor in the educational field has never been more promising. The early pioneer work has been done. The movement has already gone through its reactionary stage and is now swinging back to assume a logical, legitimate place in modern teaching procedure. The motion-picture enthusiast, who attempted to transplant the film bodily from the theater into the school, soon became convinced that it lacked educational qualities and was unpedagogical in arrangement and content. Although this experiment proved a failure, it served to attract the attention of prominent educators to the great possibilities of visual instruc-

tion as an effective aid to teaching. As a result, visual instruction as a field for research is now being scientifically studied, and the attention that is being given to this problem by universities, teachers' colleges, and public-school systems is very encouraging. It is interesting to note that three of America's oldest and most conservative universities — namely, Columbia, Harvard, and Yale — have recently taken the initiative step in offering facilities for scientific research in the field of visual instruction. Many other colleges and universities have, of course, been offering teacher-training courses for several years.

The scarcity of suitable visual materials has hitherto been a serious handicap, but it is being rapidly overcome. Such visual aids as flat pictures, maps, globes, stereographs, and stereopticon slides have been fairly plentiful and not difficult to obtain. Quite the opposite has been the case regarding educational motion pictures. Probably too much has been expected in so short a time. The classroom motion picture probably must pass through many of the same developmental stages that the printed textbook experienced, before satisfaction is reached. Yet each step in the development of the printed page, from the use of the wooden blocks and Gutenberg's movable type to the modern monotype and linotype, has added greatly to human progress. It has consumed years of patient endeavor to perfect the beautifully illustrated textbook of today, and it has not been the achievement of one individual or group of individuals, but the result of the united efforts of many — mechanical engineers, publishers, and educators. So the development of desirable visual materials requires time and the concentrated efforts of many different types of experts. The mechanical expert must perform his part in developing more suitable apparatus; the educator must assume his responsibility

of gathering educational material and of organizing and editing the same to meet the needs of the school curriculum; and, lastly, the experienced producer and publisher must be depended upon for the final production and distribution of the finished product.

It may not be looking ahead too far to predict that in the near future reliable makers of textbooks and companies producing pictures will join hands and develop valuable series of slides or motion pictures illustrating the text of the books.

Books and illustrative materials, if used pedagogically, must always supplement each other. Why then should not the textbook publisher and the picture producer coöperate for the benefit of education? For the past few years the motion-picture producers have been "picturizing" some of the "best sellers" on the screen without injuring the book market. In fact, the popular book field and the motion-picture enterprises have joined hands to the benefit of both. This coöperation will no doubt be extended to the educational field within a brief time.

Progress in all phases of visual instruction is actually taking place. Some important recent developments are extremely significant and should be recognized.

1. **The Eastman Laboratories project.** Dr. Thomas E. Finegan, nationally known educator and formerly State Superintendent of Public Instruction in Pennsylvania, was recently appointed Educational Director of the Eastman experimental tests with classroom films. In a brief report Dr. Finegan says:

> The Eastman Kodak Company decided to experiment directly in the schools for a period of two years to ascertain definitely the value of motion pictures as a classroom agency of instruction. For this purpose certain schools in the country were requested to coöperate in the enterprise.

The National Education Association, in its annual meeting at Philadelphia in 1926, approved the plan of the Eastman Kodak Company and pledged the coöperation of that organization in conducting these enterprises. Leading educators throughout the state were also invited by Mr. Eastman to attend a conference at Rochester in May, 1926. As a result of this conference and these consultations, it has been decided to make motion pictures for use in the schools for the next ensuing school year on geography, general science, and health. The geography films will be limited to the fifth and sixth grades and to the United States. General science and health will be limited to the junior high school.

If these experiments are successful and show that the motion picture is an effective agency in classroom work and that the films can be produced at a cost which will enable school authorities to purchase them, the Eastman Kodak Company will then begin the development of such series of films as will be adequate to the needs of the teaching institutions of the country from the kindergarten up through the public-school system and through the colleges, technical schools, and universities. If the film is a successful agency for instructional purposes in these teaching institutions it will also become a valuable asset for instructional purposes in all organized groups of society.

In the development of the Eastman Program, the central thought will be that the film is to be used in the classroom and for instructional purposes. The films developed for this experiment will not be for auditorium and general-assembly purposes, nor will they be made with the idea of entertaining children. No special entertainment features are to be incorporated in the films; they are to be used as the text and other apparatus is used — for regular classroom purposes.

Each film will relate to a particular lesson. In other words, they will be adjusted in a professional and scientific manner to the general courses of study which now prevail in the schools of the country. The plan is to use the film in the regular order in which the subject to which it relates occurs in the course of study. Under this plan there will be no confusion in the work of the schools. If the Rocky Mountains are to be considered on a particular day according to the course of study, a film on that subject will

be used at the time when the lesson on the Rocky Mountains is given.

The present period is regarded as an opportune time in which to introduce the motion picture into the classroom work, as the curriculum has received more study and scientific planning during the past three years than in any previous decade in the history of the country. A large number of states and nearly all the principal cities of the country have rewritten their curriculums within the past three years. The Eastman Classroom Films will be scientifically fitted into these modern courses of study.

After this careful preparation of the films, leading experts in education and psychology are employed to go over these scenarios in detail and to determine how such films may be improved. After receiving the approval of these experts, the scenario is given approval and the film is made.

The Eastman Kodak Company will equip four schools in each of these twelve centers with its projecting machine, the Kodascope, with screens, shades, etc., and will supply all the films without cost to the schools. The entire expense is borne by the Eastman Kodak Company.

To conserve the time of teachers, a Teacher's Guide will be prepared . . . and included with each film when it is forwarded to the schools in which the experiments are conducted. The Teacher's Guide will give definite direction as to the proper use of the film, its relation to the particular subject under consideration, and the usual texts on that subject. It will also contain suggestions in general as to the range and scope of the instruction, the important material which should be given consideration, and the sources of such material.

Definite tests will be organized to ascertain what value the film has as an instructional agency. Groups of pupils of equal intelligence will be selected. General tests will be given these pupils to ascertain whether they are on the same level. One group will be given instruction in geography without the aid of the films and another group with the aid of films. Those children will then be given tests on this subject at the proper time. These tests will be sufficient in number and varied in character to come to scientific conclusions as to whether or not the film has been an effective agency.

If the results of the tests show that those who have received instruction through the use of the film make better progress and have obtained a larger viewpoint and grasp on the subject under consideration, the conclusion will be that the film is a valuable asset. The difference in the ratings given in these tests between those who received instruction with the film and those without the film will be evidence of the measurable value of the film. Tests may also be made between groups of different levels to ascertain if children of lower intelligence may be progressed by the use of the film to approximately the same standard attained by those of a higher intellectual order who have not had the film. The tests will be conducted by leading experts in measurement work in the country and in accordance with the most modern professional and scientific standards that are now in operation.

2. **Yale University Press project.** For the past few years the Yale University Press has been devoting its efforts to the picturization of *The Chronicles of America* in motion-picture form. In this experiment the educational expert and the motion-picture expert have worked hand in hand. Fifteen different periods in American history have already been completed. The films which attempt to revivify these periods of history are entitled "Columbus," "Jamestown," "The Pilgrims," "The Puritans," "Peter Stuyvesant," "The Gateway to the West," "Wolfe and Montcalm," "The Eve of the Revolution," "The Declaration of Independence," "Daniel Boone," "Vincennes," "The Frontier Woman," "Yorktown," "Alexander Hamilton," and "Dixie."

The Yale University Press Film Service report as follows:

> The conspicuous success which has attended the use of the Chronicles of America Photoplays in teaching American history during the past year, has made it difficult to supply the demands for these authentic and unique historical films in some of the thirty-four exchange cities where prints are carried.
>
> Advance bookings indicate a still larger demand for 1927–1928.

3. **Metropolitan Art Museum project.** The Metropolitan Museum of Art, New York City, has launched a project to inaugurate a series of motion-picture films relating to various phases and periods of art. This is made possible largely through the opportunity to use objects owned by the museum and on display in its galleries. The museum has also produced valuable films on such subjects as "Firearms of our Forefathers," "Egyptian Monuments and Native Life," "The Spectre — A New England Legend," "The Gorgon's Head," the well-known story of Greek mythology, and "The Making of a Bronze Statue."

4. **Achievements of the Roosevelt Memorial Association.** For several years the Roosevelt Memorial Association has been gathering motion-picture films which were made during the lifetime of Theodore Roosevelt. A large number of these films have been secured by purchase or gift and have been edited, titled, and arranged with additional dramatic scenes, for general education and historical use. A few of the completed reels are "Theodore Roosevelt Himself"; "Roosevelt, Friend of Birds"; "The River of Doubt, — Roosevelt, Scientist and Explorer"; "Theodore Roosevelt, President of the United States"; "Roosevelt, Big Game Hunter"; and "Roosevelt in the Great War."[1]

5. **Production of medical and surgical films.** *The Educational Screen* magazine reports the following interesting items:

At a recent congress of the American College of Surgeons in Montreal, the report of a committee, who had been studying the subject for a considerable period of time, was laid before the board of regents of the organization. A permanent committee, including some of the most eminent doctors in America, was appointed to study and classify the films now available, to analyze the pos-

[1] Address Roosevelt House, 28 East Twentieth Street, New York City.

sibilities for future picturization and develop the more effective use of films for both professional and lay service. — *The Educational Screen*, December, 1926

Medical-film library to be established. The first medical-film library will be established by Columbia University in New York, according to an announcement by Dr. Simon P. Goodhart, Professor of Clinical Neurology. The films will demonstrate the latest developments in the fields of medical and surgical science. Prints of the library negatives will be distributed to clinics throughout the world. — *The Educationl Screen*, November, 1926

Developments in Germany. We are glad to publish from our correspondence with the *Verlag Wissenschaftlicher Filme*, Berlin, facts which will be of vital interest to the medical profession, as well as those interested in the advancement of scientific film production.

Dr. A. von Rothe, the well-known Berlin surgeon (Medical Director and Chief Surgeon of the Municipal Hospital in Berlin-Wilmersdorf), has overcome all these difficulties by his apparatus and process, which have been patented in Germany as well as in nearly all other countries (American patents No. 1510527 and No. 1514069). This new apparatus catches the operation from above in the same manner as the eye of the operating surgeon, thus fixing the operating proceedings from first to last. It penetrates into the remote cavities of the body and portrays the minutest details which might have been overlooked by the eye, so that every manipulation can be followed and every instrument observed while in use. The new apparatus derives its source of light from outside the operating room and exiles the operator from the surgeon's range.

The apparatus is suspended from the ceiling and is entirely enclosed in a metal case. By means of motors which are fixed above the ceiling and outside the room, the apparatus can be raised, lowered, turned and inclined in all directions. A telescope which is connected with the apparatus by a special mechanism serves for gauging and focusing. The film itself is moved by the aid of a motor which can be connected and disconnected by means of a foot contact. The apparatus is worked from a small movable table, the surfaces and handles of which are sterilized. The sur-

geon adjusts the apparatus himself at the commencement of the operation by means of a few manipulations, without causing any delay in the operation itself. A change of the film magazine, even in the case of long operations, is avoided.

By means of Dr. A. von Rothe's invention, a difficult field for medical research has been popularized and opened for clinical observation. The technique and method of the surgeon can now be fixed and treasured for the benefit of the student. Various methods can be compared in the lecture halls and at congresses. Risk of misunderstanding is banished and difficulties of language are overcome. An easy exchange of precise surgical science has been made feasible — the new step to the internationality of science has thus been taken.

With the aid of the Prussian Minister of Culture, the inventor has founded an institute of his own in the Berlin Charité and since the beginning of 1922 has made instructive films in cooperation with university professors in promoting the technique of film instruction and organizing a medical-film archive.

From the release offices of this organization, which has the sole right of copying and selling the photographs of this institute, the results of these researches — pictures taken by the greatest authorities of the entire field of medicine — have been placed at the disposal of the scientific world. Several hundred subjects from the archives of the Medical Cinematographic Institute for Teaching and Investigation have been classified into the following divisions: surgery; anatomy; ophthalmology; bacteriology; experimental biology; genealogy; laryngology, rhinology and otology; skin and sexual diseases; pediatrics; microscopy; neurology; parasitology; pharmacology; physiology; physiology of movements; psychiatry; psychology; veterinary medicine; dental surgery; internal medicine; orthopedics; general subjects.—*The Educational Screen*, May, 1927

Social-hygiene films. A recent issue of the *Social Hygiene News* carried this brief paragraph, which will serve to suggest, however, the vast influence exerted by the visual material distributed by the American Social Hygiene Association.

Since 1920, copies of our films have been distributed to official and voluntary agencies in seventeen countries outside of the United States.

The inhabitants of Egypt, China, and even Iceland are receiving the social hygiene message that the films impart. Thirty-four copies are being used in England.—*The Social Hygiene News*, November, 1926

6. **Achievements of the United States government.** The quotations that follow cover a number of interesting items.

Alaskan aërial mapping. The Christian Science Monitor reports that the first two months of the four-year program of mapping 25,000 miles of southeastern Alaska has resulted in an unexpected victory, according to reports from members of the Alaska Aërial Expedition, who have progressed from their first base at Ketchikan to the second station at Wrangell.

Fifteen rolls of film, equal to nearly 6000 feet of airplane "mosaics," have been received at Washington and are to be placed in the vaults of the United States Geological Survey to await the return of the chiefs of the department from Alaska.

The United States Navy is bearing the entire burden of the expedition this year, but twelve different government bureaus are watching the survey and assisting wherever practicable and plan to apportion the expense among the coöperating departments next season.

It is an interesting coincidence that the tri-lens aërial camera used by the expedition was developed by Major James W. Bagley, now of the United States Army Engineers, but for twelve years an expert attached to the Geological Survey and familiar with the mountainous terrain of Alaska through a period of many trips north.

Two airplanes, flying in line, can map a strip approximately one hundred miles long and fourteen miles wide in an hour, as each camera photographs an area about seven miles wide at one exposure, with its three lenses. This is at a height, or "ceiling," of 10,000 feet, which gives a clear view of the countryside.

The feat of mapping southeastern Alaska can hardly be overestimated, and is scarcely less spectacular than the recent dash to the North Pole. The region abounds with mountains 10,000 to 20,000 feet in height, whose peaks are constantly crowned with snow, and whose lower slopes are covered with heavy forests that

for many years have safely defied the combined efforts of timber cruisers and surveyors. — *The Christian Science Monitor,* November, 1926

Airplane an important factor in making New Hampshire maps. The same newspaper publishes an account of the photography being done for the United States Geological Survey in the making of new topographic maps of the State.

> Speed and accuracy in map making are both advanced by use of the airplane, which last summer made possible a rapidity of progress in New Hampshire that otherwise would have been out of the question.
>
> In ten days photographs were taken from the air that covered about 2600 square miles, and the field parties, with these to aid them, completed an amount of work in a few months that a decade ago would have taken a year and probably longer.
>
> After the photographs had been taken from the air, the men in the field based all of their surveys upon them and related all their data to the physical facts as shown in the developed pictures.
>
> New Hampshire is the first state in which aërial photographs have been used to any great extent in connection with the geological survey. — *The Christian Science Monitor,* April 8, 1926

To preserve historical films. All films of historical value to posterity will be preserved by the United States government if a plan suggested by the Motion Picture Producers and Distributors of America is carried out.

The plan calls for space in the new Archives Building to be erected in Washington, in which thousands of reels of important motion pictures made during the war, news events, beginning with the inauguration of President McKinley, and historical dramas, may be saved. Vault space to hold 50,000 reels is asked.

Negatives of immense value are now scattered in various vaults all through the country. Some are being inspected regularly and will be saved in the event the vaults are procured. — *The Educational Screen,* October, 1926

Future importance. A certain small part in education is already taken by moving pictures, but it is nothing compared with the possibilities opened up by thought of what may be done in the next hundred years. If the plan suggested to President Coolidge by Mr. Will Hays is carried out, the salient events of the coming years will be pictured and stored away in the Archives Building at Wash-

ington. Schoolboys who feel an indifference amounting to nausea for textbooks of history will be interested, despite themselves, in seeing great things happen on the screen. The educational value of films used at present by students of zoölogy, botany, anatomy, chemistry, and kindred subjects is unquestioned. If the field can be broadened to include and freshen certain dry subjects, it should be. — *The New York Times*

Americanization work on incoming ships. Patriotic and historical motion pictures are to be shown in the steerage of transatlantic steamships bringing immigrants to this country, under arrangements just made by the motion-picture industry and various steamship lines. The films will be furnished free of charge.

All films shown will be specially selected pictures giving the future citizens their first lessons in American citizenship. Thus, before America's soil is reached, her customs, her backgrounds, and her ideals will be brought directly to the attention of these people.

Many ships have had pictures for some time as a part of the entertainment provided for passengers but never before have motion pictures been used in the steerage for immigrants. — *The Educational Screen*, November, 1926

7. **Stimulation of interest in more artistic educational films.** It is encouraging to note that important steps are being taken to stimulate interest in the production of more artistic educational films. *The Educational Screen* reports the following:

The Riesenfeld award. The Hugo Riesenfeld Gold Medal for 1926 has been awarded to "The Vision," Educational Film Exchanges' Romance Production in Technicolor, as the most novel short subject released in this country during 1926. This outstanding honor was awarded to this two-reel dramatic subject by vote of the committee of prominent exhibitors.

The Riesenfeld Medal is given annually to the producer of the best short subject, exclusive of comedies, during the year. This is the second year in succession that an Educational Picture has been awarded the Riesenfeld Medal, "The Voice of the Nightin-

gale," produced by L. Starevitch, a Pole, for Pathé Consortium of Paris and released in this country by Educational, having won the distinction in 1925, when the Riesenfeld Medal was awarded for the first time.

"The Vision," which was made entirely in natural colors, was Arthur Maude's conception of what inspired Sir John Millais to paint his masterpiece, "Speak! Speak!" now hanging in the Tate Gallery, London. Maude, the author of the story, also directed the two-reel picture. — *The Educational Screen*, May, 1927

. 8. **The Pathé Current Events course of motion pictures.** The Pathé Exchange has launched a pioneer project in offering to public schools a current-events course. This course is assembled from the regular Pathé News weeklies shown in the theaters. Desirable subjects, selected from the contents of two weekly releases, are assembled in one reel. When current-history courses can be supplemented by such Pathé News reels as "Byrd's Expedition to the North Pole by Airplane from Spitzbergen," "The Smithsonian Expedition to Central Africa," or "Soviet Russia Revealed," the future possibilities of the motion picture as a teaching aid seem almost unlimited.

9. **All mechanical developments.** The future holds in store even greater possibilities along the line of improved mechanical equipment. Some modern inventions, such as the talking motion picture, known as the vitaphone, seem almost magical in the effects achieved.

The following comments will be of interest:

Talking motion-pictures in which the simultaneous timing of action and sound is at all times assured have been announced by the General Electric Company, and a private demonstration was recently given in a New York theater in which two reels of a popular film were displayed with synchronized incidental music and later singers and musicians were simultaneously seen on the screen and heard through a loud-speaker on the stage. Several such devices have been given publicity lately; this one, the

Washington *Star* explains, "is regarded as a distinct advance in that not only is there a perfect synchronizing of light and sound, but that the reproduction of the sound is more perfect." The process, said to be the result of several years of experimenting in the General Electric's Schenectady laboratory, means but slight change in standard projectors, and involves only the addition of

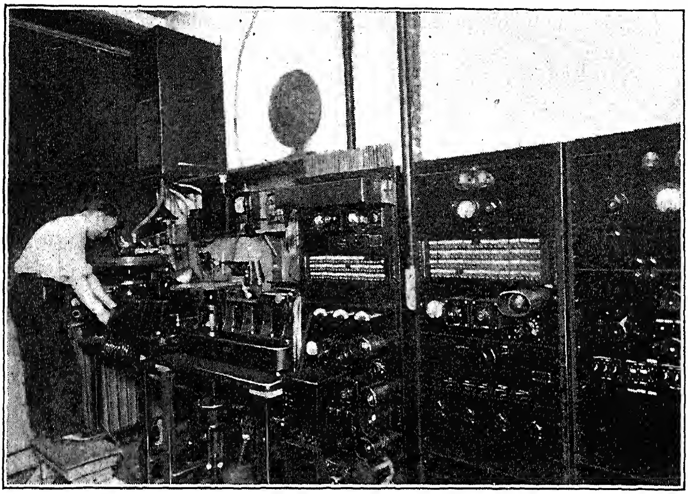


FIG. 149. A new electrical sound-recording system which is one of the significant developments making possible synchronization of motion pictures with complete orchestral accompaniments and vocal music

Courtesy of the Western Electric Company of New York

a sound-reproducing attachment and a loud-speaker suitable for auditorium use. Both the picture and the sound are recorded on the same film. (See Figs. 149, 150, 151, 152, 153, 154.)

There are three principal elements in the apparatus, including a standard motion-picture camera, a sound recorder and a standard motion-picture projector with a sound-reproducing attachment, all driven by synchronous motors. The pictures themselves are made in the usual way on standard film.

In recording the sounds, a microphone, or sound collector, of any desired type is employed, together with amplifiers. The microphonic system actuates a tiny vibrating mirror which records the sound on the

film as light and dark bands, the light from a small incandescent lamp being reflected by the mirror through a tiny slit in the optical system in front of the film. The higher the pitch of note, the higher its frequency — and the greater the frequency of vibrations of the mirror which faithfully reproduces each sound vibration as a mark on the film.

At this early date it is not possible to define the fields in which this new type of talking motion-pictures will be of use. One of the first, however, will be in supplying a full orchestral accompaniment for pictures. The community picture-house, accustomed to having a piano, or piano and violin, will be able to have the same music as the metropolitan theater.

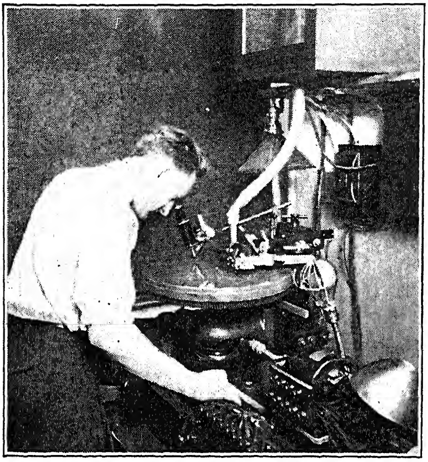


FIG. 150. An operator is shown looking at the wax disk upon which sound vibrations are recorded

The electrical system of recording employs a high-quality microphone, an electrical amplifying apparatus, and the record-cutting mechanism which appears in the picture. (Courtesy of the Western Electric Company of New York)

Another field is offered by the news reels. Not only will it be possible to show important persons, but they can talk to the audience, and visiting notables can extend their greetings.

It has not been possible for famed musicians and orchestras to appear in small communities. The new talking motion-pictures will permit them to be both seen and heard throughout the country.

Educationally there are also many ways in which the new apparatus will be of service. Many schools and colleges are already equipped with motion-picture projectors as an aid in classroom work, and the new film will be found of even more assistance. In the case of professors from abroad, it will be possible to record their lectures and demonstrations simultaneously, and to give their lectures the widest possible use by circulation of the film to colleges and universities throughout the country. Similarly, an authority on the subject can give a description to accompany any educational film for use in schools, the speech pointing out the important features of the picture simultaneously with their appearance on the screen.

These are but a few of the fields in which the talking motion-pictures will find applications. The list can, and will, be expanded. — *The Literary Digest*, March 5, 1927

Color photography. *The Educational Screen* says the following:

A highly interesting discourse on color moving-picture photography was given by L. A. Jones of Rochester, New York, before the joint session of the Optical Society of America and the American Physical Society, March 5th, at Montreal, Canada.

"Within ten years the majority of pictures shown on the moving picture screen will be colored," declared Mr. Jones.

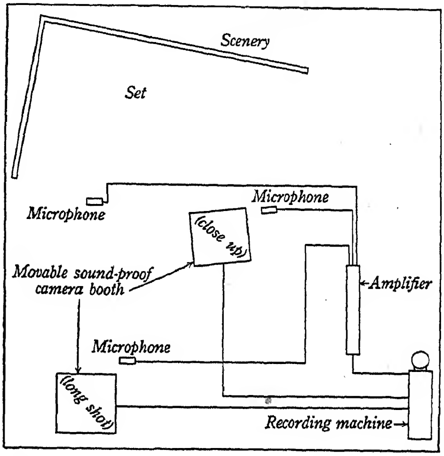


FIG. 151. A schematic layout, indicating the arrangement of important elements of the apparatus used in producing synchronizations of visual and audible entertainment

Courtesy of the Western Electric Company of New York

"We have the colored moving pictures now and the question is one of cost and future development of the process. The colored moving picture is somewhat more costly, but the production is just as simple a matter as that of black and white. But we cannot at present produce all the colors in nature. The process in making colored movies is now a two-color subtraction process and we can produce all the colors in the spectrum from the red over to the blue-green. But we cannot reproduce the violets and the purples; therefore we cannot reproduce all the colors of nature. But by taking advantage of simultaneous contrast in the composing of pictures we can provide what looks like purple to the untechnical eye." — *The Educational Screen*, May, 1926

Stereoscopic film in production. Work has begun at the Vitagraph studio in Hollywood on the first picture to be made by the Spoor third-dimension photography. The production is being directed by J. Stuart Blackton, and is tentatively titled "The American."

The Spoor film is projected on a screen 42 feet wide and 23 feet high. The taking of the picture requires film made especially for the stereoscopic camera, which is nearly twice the width of ordinary film and one and one half times the frame height.

The completed film is to be displayed as a "road show" by the producers. Special projectors and screen will be carried. — *The Educational Screen,* February, 1927

Motion pictures by radio. The following quotations are from the *Educational Screen.*

A prediction that within ten years men will be able to see and talk to each other across the ocean, was made by Dr. E. F. W. Alexanderson, consulting engineer of the Radio Corporation of America and the General Electric Company, in discussing "television," the transmission of pictures by radio, before the American Institute of Electrical Engineers in a recent meeting at St. Louis.

Several pictures made by the process were exhibited. In outlining the possibilities, he predicted the day was not far distant when radio motion pictures could be transmitted across the Atlantic. The telephoto, says its inventor, projects an almost instantaneous picture of whatever is visible at the transmitting station. In addition, he predicted the device would be coupled with radio telephony, so that pictures and sound could be transmitted simultaneously.

Stating that the human retains an impression for one-sixteenth of a second, Dr. Alexanderson declared that whereas the telephotograph takes 20 minutes to convey an impression, the televisor must operate 20,000 times as fast and complete the whole job in one-sixteenth of a second. The invention opens up the way for motion pictures in the home, he said, with the incidental inception of the radio theater.

The apparatus actually paints its image on the receiving screen with a spot of light that whips over the screen within

a sixteenth of a second. The beam is controlled by a photoelectric cell and is continually modulated. Twenty-four mirrors on the periphery of a rotating wheel catch the beam successively and project it on the screen, each mirror advancing it to a new position or streak, while the entire screen has thus been "scanned" by the dancing spotlight.

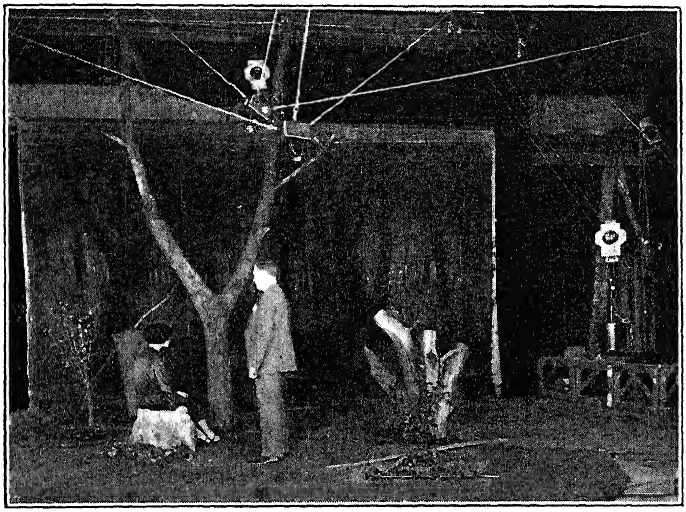


FIG. 152. By means of microphones of an improved type the recording of sounds may be carried on at a considerable distance from the source, so that the actors or musicians may be grouped naturally instead of being crowded before a microphone

The development of this system of synchronization is the result of years of research. (Courtesy of the Western Electric Company of New York)

Three steps must be accomplished before television can be developed to the point of a public utility, according to Dr. Alexanderson. The first — broadcasting of pictures — has already been accomplished in laboratory tests, he said, and now only needs perfecting of a method of reception. Likewise, the second step — the sending of facsimile messages — has been accomplished, but more speed in the process is necessary before it can become practical.

"After that," he said, "must come the development of speed enough to send a motion picture film from any part of the world. News reels of the events of the day may then be shown everywhere the day they happen.

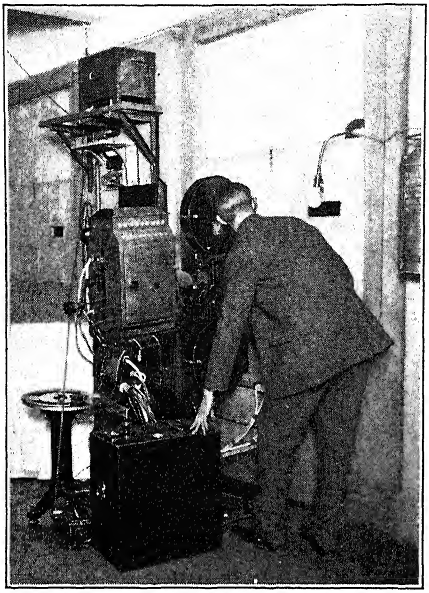


FIG. 153. This projection machine is part of the system by means of which complete musical programs, played by the world's greatest musical organizations, are available in any motion-picture theater

Absolute synchronism gives the reproduced sound a naturalness never before attained. The projector is no more complicated from the standpoint of operation than an ordinary moving-picture projector. (Courtesy of the Western Electric Company of New York)

"The next step will be actual television—when the motion picture of a person at a telephone on one side of the Atlantic, or equally far away, will coincide with the hearing of the voice of the person on the other side of the Atlantic.

"The two fundamental obstacles that once made people say television was impossible already have been removed. The discovery of the short wave gave us potential speed enough for transmission. The devising of a television projector using seven light sources increases the useful illumination forty-nine times and provides all the light necessary for the screen."

Dr. Alexanderson said that in laboratory tests pictures have been sent in ten seconds, but that television will require the transmission, reception and reproduction of a picture in one-sixteenth of a second.—*The Educational Screen*, April, 1927

New speed camera. J. W. Legg, engineer of the Westinghouse

Electric and Manufacturing Company, has invented a camera with a speed fifteen times as rapid as ordinary motion picture cameras, and capable of taking 2600 photographs per second. It was designed chiefly to study the exact character of flashes occurring in generators and other electrical machines. The camera has twenty-two lenses and a shutter rotated at high speed by a small motor.

Standard 8–10 inch plates are used. After exposure each plate carries twenty-two photographs in stereoscopic pairs. The shutter

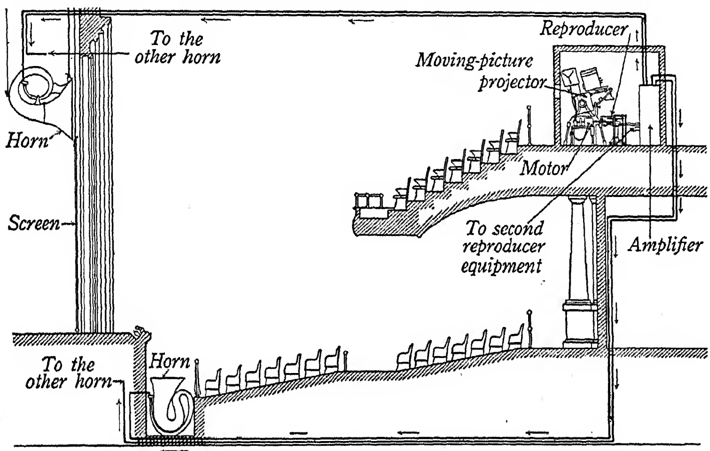


Fig. 154. A cross section of a typical motion-picture theater, showing schematically the apparatus necessary for perfectly synchronizing motion-picture film and sound

Courtesy of the Western Electric Company of New York

may be operated at any speed it is said, but to record the quickest flashes a speed of 2600 exposures per second is required. — *The Educational Screen*, April, 1927

New camera for aquatic photography. The Smithsonian Institution of Washington has announced that the mysteries of aquatic life of the ocean will soon be revealed by means of a motion-picture camera especially adapted for use on the sea bottom.

This new type of camera has been developed by Dr. Paul Bartsch, curator of mollusks in the National Museum, and Andrew Cramer, instrument-maker of the Smithsonian Institution, and

will be tried out at the marine biological station of the Carnegie Institution at the Tortugas.

It is expected that the improvements made over the old type of submarine camera will make it possible to record the life of deep-sea denizens as simply and as accurately as if it were on land.

"Quite apart from the educational importance of the secrets which this new invention will reveal to mankind, it has a great scientific value one phase of which can be mentioned," the announcement said. "It reveals the faunal associations under the sea. Thus scientists can learn what groups of life gather together and under what conditions of temperature, salinity and so on. This information gives them the key to the condition in which fossil marine animals lived and will be of great assistance in correcting geologic time."

The new submarine camera, it is explained, has several marked advantages over the type hitherto used in photographing deep sea phenomena. It carries a load of 400 feet of film, while the old type carried only 16 feet. It is set on a tripod, can be tilted, timed, and focused as readily as on land. — *The Educational Screen*, October, 1926

The accounts of progress related above are only a few of the almost magical achievements which have been accomplished during the last few years. The reader will also bear in mind that scientists are constantly at work in their laboratories making improvements on apparatus now in use and further making new discoveries which will result in the development of entirely new possibilities in visual instruction. It is evident, therefore, that no book printed today can be strictly up to date in such matters or even attempt to predict the scientific achievements of tomorrow.

A NEW RESPONSIBILITY OF THE PUBLIC SCHOOL

Mankind's great need definitely evidenced in every phase of life the world over is the establishment of permanent world peace. It is the outstanding issue of the

age, and the responsibility for its consummation must of necessity fall largely upon the public school. The importance of this duty of the school is imperfectly appreciated by teachers and educators generally.

War is a relic of barbarism which the race, thus far, has never been strong enough to throw off. What is it, in the hearts and minds of the peoples of the world, that has prevented universal peace and fostered strife?

It has become a custom among all peoples to look upon all foreigners as inferior because they are different — not of our kind. The American is inclined to look down on the Oriental and call him a heathen simply because his customs and traditions are unlike his own; and, at the same time, to the Oriental the American is a foreign barbarian with crude manners and a soulless civilization. Ignorance and intolerance, then, are at the root of the evil — war; and the two great forces that can save the world from a backward step and bring general harmony between peoples and nations are understanding and human kindliness.

The public school is the one great institution that, through its strategic position, has the power to spread education of the right sort, to direct thinking, and to bring nations into better understanding and appreciation of one another. The average adult mind is filled with an accumulation of prejudices, but the developing child's mind is plastic, free, and natively loving. Public-school teachers of the world, then, hold the destiny of the future in their hands. The ideals and attitudes of the future generations depend, from now on, on what is taught and how it is taught in our public schools.

THE FUTURE MISSION OF VISUAL INSTRUCTION

The problem of world peace involves world education — education that deals with certain definite ideals and principles. The great masses of peoples in all states of civilization, literate and illiterate — Filipino, Samoan, Hindu, Chinese, Japanese, Spanish, German, Russian, Mexican — must be reached. Peoples speaking different languages and numerous different dialects of the same language must be persuaded to change their mode of thought.

The pictured illustration is the only universal language at hand, and it seems to present the most logical and feasible means on which to concentrate attention and with which to begin organized work for world education. The motion picture is not a far-off vision which we hope to perfect at some future time; it is already here reaching out into every nook and corner of the globe, wielding its powerful influence for good or bad.

The habit of seeing and enjoying the motion picture is already created. The whole machinery with which to start organized propaganda is in full working order in many schools, churches, and theaters of all nations. The educator's duty lies only in the organization of a definite campaign and the production and classification of the right sort of educational visual materials. It seems, however, that such work must be centralized and unified through national and international educational association.

Organization, time, money, and a sincere desire to do are prerequisites to success. The Red Cross, with its powerful international organization, has proved to the peoples of the world what good can be done through a unified organization making the *right* appeal. The Red Cross has converted the world to its cause, and financial support has been unstintedly generous. Why? Because

its cause is just and appealing. People want to serve, but capable leadership is necessary. And how is the Red Cross spreading its propaganda for sanitation and health? Through the appealing motion pictures, slides, and attractive posters, which all peoples alike can read and interpret. Today these visual aids are used in schools, churches, and theaters all over the world. It is fully realized that visual instruction is the only feasible means of teaching the masses directly.

Educational needs for world peace. In order to carry on a constructive campaign for world peace it seems evident that we need a large library of specially selected films, slides, and posters which will portray the truth regarding peoples of the world. The good and beautiful of every civilization must be portrayed accurately. Peoples are more alike than different, and every civilization has something which is worth while and which deserves careful study. But no outsider can look on and interpret the finest in any civilization. Individual nations must work coöperatively in building up a variety of suitable material which will show types of peoples at work and at play the world over. This material must be filled with the human element so that it may be highly interesting as well as instructive. Such a library must be organized, controlled, and distributed by an efficient international bureau. The public schools of the world are ready and clamoring for such material. There are already many travel films in the field for the upper grades, but there is almost no material of the right sort for the primary grades; and this is where the foundation of the work must begin. Here we need visual material portraying people and home life and stories and fairy tales of various lands. The weaving in of episodes, dramatic action, an element of humor, and the like greatly enhances the teaching value of any edu-

cational material. It must contain a gripping appeal if we are to hope for effective results. Such films might be used not only as regular supplementary texts in all public schools, but might be widely distributed in community centers, churches, clubs, and theaters.

There are ways to peace when there is an honest desire for peace. The difficulty seems to be that there have never been enough persons in the world who have wholeheartedly desired peace. When understanding and human kindliness become a vital part of our consciousness, prejudices will be overcome, differences will be adjusted, and a new era will surely be born into the world. It is in helping to solve this great problem of modern civilization that visual instruction promises to render its greatest service to humanity.

APPENDIX A

SOURCES OF SUPPLY FOR ILLUSTRATIVE MATERIALS
(Partial List Only)

The prices of the following illustrative materials and apparatus are quoted merely as approximate guides to probable costs. The prices, of course, fluctuate considerably. Up-to-date catalogues may be obtained from the firms named.

I. PHOTOGRAPHS AND PRINTS

Illustrated magazines (partial list)

Asia, published by Asia Magazine, Inc., 461 Eighth Avenue, New York City. Subscription, $4.00 per year.

Current History, published by New York Times Company, New York City. The June, 1924, issue contains sixteen pages of colored plates of the treasures in the tomb of King Tutankhamen (excellent set). Subscription, $3.00 per year.

Economic Geography, published by Clark University, Worcester, Massachusetts. Subscription, $4.00 per year.

Good Housekeeping, 119 West Fortieth Street, New York City. Subscription, $3.00 per year.

Japan. Overseas magazine of travel, published by Toyo Kisen Kaisha Co., 551 Market Street, San Francisco, California. Subscription, $1.50 per year.

Ladies' Home Journal, published by the Curtis Publishing Company, Philadelphia, Pennsylvania. Subscription, $1.00 per year.

Mentor, The, published by the Crowell Publishing Company, Springfield, Ohio. Subscription, $4.00 per year.

National Geographic Magazine, published at Hubbard Memorial Hall, Washington, D.C. Best source of supply. Subscription, $3.50 per year.

Nature Magazine, published by American Nature Association, 1214 Sixteenth Street, N.W., Washington, D.C. Large colored print for mounting with every copy. Subscription, $3.00 per year.

Travel, published by Robert McBride Company, 7 West Sixteenth Street, New York City. Subscription, $4.00 per year.

Travelers' guide booklets, such as railroad and steamship folders.

Commercial dealers in photographs and prints

Art Institute of Chicago, Chicago, Illinois.
Art in color (25 cents).

Asahel Curtis Photo Company, 625 Colman Building, Seattle, Washington.
Photographs of the Pacific Northwest ($8'' \times 9\frac{1}{2}''$; 50 cents).

Boston Museum of Fine Arts, Boston, Massachusetts.

Vera Jones Bright (Western distributor of art pictures), Children's Book Shop, Post Street, San Francisco, California.
Prints of masterpieces.

Brown-Robertson Company, Incorporated, 8–10 East Nineteenth Street, New York City.
Art in color (3 cents, 40 cents and up).

Brown's Famous Pictures, 38 Lovett Street, Boston, Massachusetts.

Pietro Cartoni, 420 Boylston Street, Boston, Massachusetts.
Alinari's colored reproductions of old masterpieces for framing only.

Cosmopolitan Print Department, 119 West Fortieth Street, New York City.
Bessie Pease Gutmann's baby pictures, hand-colored ($14'' \times 21''$; $1.75).
Jessie Wilcox Smith's Mother Goose series in full color ($12'' \times 14''$; 25 cents or $4.00 per set of 18).
Maxfield Parrish's Wonder Tale Pictures in eight colors ($7\frac{1}{2}'' \times 6\frac{1}{2}''$; $1.20 and up).

Denoyer-Geppert Company, 5235 Ravenwood Avenue, Chicago, Illinois.
Lehman colored history, geography, nature pictures, and charts ($35'' \times 26''$; $1.60).
Photographs of Greek and Roman sculpture (40 cents).

Detroit Publishing Company, Detroit, Michigan.

Plain and colored pictures for geography, history, nature study, geology, etc. (7″ × 9″; 50 cents).

Elson Art Publication, School Street, Belmont, Massachusetts.

Reproduction of masterpieces.

The House of Art, 59 West Nineteenth Street, New York City.

African desert pictures (9″ × 12″; 75 cents).
Old and modern art.
Beatrice Parson's garden pictures in full color (11″ × 15″; $2.00).
F.M. Pilkington's English Gardens (8″ × 12″; $1.80), mounted.

Rudolph Lesch, 225 Fifth Avenue, New York City.

Rhine prints and Seeman's color reproductions. Excellent for school use (average size 7″ × 9″; 25 cents and 50 cents).

Medici Society of America, 755 Boylston Street, Boston, Massachusetts.

Old and modern masters in color (post cards, 10 cents; $6\frac{1}{2}$″ × $4\frac{1}{2}$″, 20 cents; 8″ × 10″, 35 cents).
Margaret Tarrant's pictures for children ($7\frac{1}{2}$″ × 10″, 20 cents; $9\frac{1}{4}$″ × $11\frac{3}{4}$″ mounted, 40 cents; done in four-color process for framing, $2.00).

Metropolitan Museum of Fine Arts, New York City.

Photographs of painting, pottery, and textiles.

Milton Bradley Company, Springfield, Massachusetts; San Francisco, California; and other large cities.

Birds and animals in color (3 cents).
Jessie Wilcox Smith's primary pictures (25, 50 cents).

A. W. Mumford, 536 South Clark Street, Chicago, Illinois.

Plant and animal life in color (7″ × 9″; 2 cents).

National Child Welfare Association, Inc., 70 Fifth Avenue, New York City. Large picture charts for physical and character development. Panels range about 17″ × 28″. See illustrated catalogue.

National Geographic Society, Washington, D.C.

Geographic pictures in sets with a descriptive text ($1.50 per set).

Perry Picture Company, Malden, Massachusetts.

Birds, flowers, fruits in color (7″ × 9″; 3 cents).

Black-and-white pictures for geography, history, art, and nature study (3″ × 3½″, 1 cent; 5½″ × 8″, 2 cents; 10″ × 12″ in sepia, 10 cents).

Portraits of Washington and Lincoln and Pilgrim pictures are particularly good in the 10″ × 12″ size, sepia tone.

Publisher's Photo Service, Inc., 105 West Fortieth Street, New York City.

Photographs of all parts of the world.

E. T. Shima, 40 West Forty-sixth Street, New York City.

Japanese prints.

Antone Soares, P.O. Box 276, Haywards, California.

Excellent hand-painted photographs of California wild flowers (5″ × 7″; 75 cents); 500 varieties.

The University Prints, 11 Boyd Street, Newton, Massachusetts.

Reproductions of masterpieces and Greek and Roman sculpture in black and white (5½″ × 8″; 1½ cents).

Yamanaka and Company, Boston, Massachusetts.

Japanese prints.

Post cards for opaque projection

Art

American News Company, New York City.
Canada Railway News Company, Ltd., Toronto, Canada.
C. P. Johnson Company, Seattle, Washington.

Scenic

Detroit Publishing Company, Detroit, Michigan.
Hawaii and South Seas Curio Company, Honolulu, Hawaii.
Hongkong Pictorial Postcard Company, P.O. Box No. 4, Hongkong, China.
Island Curio Company, James Steiner, Honolulu, Hawaii.
Pacific Novelty Company, San Francisco, California.
Philadelphia Post Card Company, Philadelphia, Pennsylvania.
M. Rieder, Publisher, Los Angeles, California.
Rotograph Company, New York City.
Santa Fe Company, San Francisco, California.
Southern Pacific Company, Oakland Pier, Oakland, California.
Wilson and Company, Photographers, Orchard Road, Singapore.

II. PICTORIAL CHARTS; GLOBES AND MAPS

Charts

Denoyer-Geppert Company, 5235–5257 Ravenwood Avenue, Chicago, Illinois.

Anatomical charts and manikins ($16\frac{1}{2}'' \times 28\frac{1}{2}''$).
Andersen-Balsleu insect charts in natural color (40″ × 30″; $2.50 and up), mounted on cloth.
Arnold food charts (42″ × 36″), mounted on cloth with brass eyelets or on spring roller.
Graph charts (1″ square, 30 squares each way), printed on slated cloth.
Jung-Koch-Quentell zoölogy and botany charts (40″ × 30″).
Lehmann animal, bird, reptile, and fish wall charts (35″ × 36″).
Longworthy food charts (21″ × 27″).
Schmeil zoölogy charts (64″ × 48″).

National Child Welfare Association, 70 Fifth Avenue, New York City.

Colored panels on health, and Mother Goose rhymes (17″ × 28″; 85 cents).

A. J. Nystrom & Co., 3333 Elston Avenue, Chicago, Illinois.

Johnson physiology charts and natural history (30″ × 40″).
Jung, Koch, and Quentell botany charts (40″ × 30″; $3.25), mounted on durable muslin, with eyelets, in true-to-life colors.
Meinhold colored animal charts (36″ × 26″).

Globes and Maps

Globes (80 cents to $75)

A. J. Nystrom & Co., 3333 Elston Avenue, Chicago, Illinois.

Physical-political globes ranging from individual 6″ wire stand to 18″ portable or suspension globes.
Physical-political simplified 12″ globes for elementary grades.
Plain slated globes (6″ to 18″); lunar tellurian to show the movements of the earth, etc.

Denoyer-Geppert Company, 5235 Ravenswood Avenue, Chicago, Illinois.

Andrews colored-zone lunar tellurian.
Physical-political globes (6″ to 18″), all types.
Plain slate or continents outlined in white.

Rand, McNally & Company, Chicago, Illinois.

Plain relief globes (12″); excellent for elementary grades.

Physical-political (J. Paul Goode) globes (6″ to 18″; 12″ simplified globes for elementary grades).

Wall maps (geography and history)

A. J. Nystrom & Co.

Atwood regional-political maps; contain one large map with small relief, rainfall, population, and land-utilization maps across the bottom; excellent new series for comparative map study.

Finch products and industries maps with graphic charts.

Johnston physical-political series.

Kuhnert relief-like series of physical maps.

Nystrom rainfall, trade, etc.

Sanford American-history maps.

Slated-cloth maps.

Thorne-Thomsen graphic relief of physical maps.

Webster-Knowlton-Hazen ancient and medieval history series.

Denoyer-Geppert Company.

Bauldamus-Schwabe classical wall maps.

Blackboard outline maps; printed on slated cloth, eyelet or roller type; United States on one side, the world on the other.

Graph charts (1″ or $1\frac{1}{2}$″ squares, 30 or 36 squares each way); printed on slated cloth.

Hart-Bolton American-history maps.

Philips comparative wall-atlas maps; rainfall, temperature, population, and vegetation.

Political and physical maps.

Spruner-Bretschneider European-history maps.

Rand, McNally & Company

J. Paul Goode's physical-political maps; excellent color scheme.

National Geographical Society, Washington, D.C.

Physical-political maps of excellent quality; continents and races of mankind; paper edition only.

Desk maps

A. J. Nystrom & Co.

Desk outline maps (7″ × $8\frac{1}{2}$″, 1 cent; 11″ × 17″, 2 cents).

Denoyer-Geppert Company.

Desk relief maps, actually raised (9″ × 11″ and double size); excellent for pupils' use.

Desk outline maps ($7'' \times 8\frac{1}{2}''$, 1 cent; $11'' \times 17''$, 2 cents); outline printed in blue.

Ginn and Company, 15 Ashburton Place, Boston, Massachusetts.

Atwood, Allen, and Robinson's "Practical Map Exercises in Geography and History" (square 4to, 32 pages + 32 sheets of tracing paper; 56 cents a set); there are two sets — Western Hemisphere and Eastern Hemisphere.

Lantern-slide maps (physical-political)

Keystone View Co., Meadville, Pennsylvania

Colored maps by J. Paul Goode ($1.95); continents, countries, and regional sections of the world.

Teachers may obtain serviceable maps from steamship and railroad companies, from chambers of commerce, state departments, United States Government bureaus, such as the Department of Agriculture, and from the *National Geographic Magazine*. A list of commercial dealers and publishers is given above.

III. EXHIBITS, MODELS, AND SPECIMENS

Industrial Exhibits

Industrial exhibits of all kinds may be obtained for little or no charge from various county fairs, city chambers of commerce, and factories. Among the factories sending out valuable exhibits are the following:

Cocoa and chocolate

Hershey Chocolate Company, Hershey, Pennsylvania. Seven bottles in case.

Walter Baker Company, Milton, Massachusetts. Small exhibit in case.

Walter Lowney Company, 456 Hanover Street, Boston, Massachusetts. Exhibit case.

Coffee

Hills Brothers, San Francisco, California. Small compact case.

McLaughlin Company, Chicago, Illinois.

Cork and linoleum

Armstrong Cork Company, Lancaster, Pennsylvania. Complete exhibit.

Linoleum and oilcloth works, Kearny, New Jersey.

Corn

Corn Products Company, Jersey City, New Jersey, and New York City. Exhibit of flour, sirup, glucose, and starch.

Cotton

Amoskeag Manufacturing Company, Manchester, New Hampshire. Small glass-front case, cotton and worsted.

California Cotton Mills, Oakland, California. Large glass-front case (about $5.00).

Dallas Cotton Mills, Dallas, Texas.

Pacific Mills, Lawrence, Massachusetts. Complete exhibit in glass-front case.

Extracts

Price Flavoring Extract Company, Chicago, Illinois.

Felt

Bellville Hat Factory, Burlington, New Jersey.

Flax

James McCutcheon and Company, Fifth Avenue and Thirty-fourth Street, New York City.

Flour

Pillsbury Flour Company, Minneapolis, Minnesota. Large complete case.

Sperry Flour Company, San Francisco, California. Exhibit case.

Washburn Crosby Flour Mills, Minneapolis, Minnesota. Flour-mill model ($3.50).

Glass

Pittsburgh Plate Glass Company, Pittsburgh, Pennsylvania. Complete exhibit, very heavy.

Grain

Commissioner of Immigration, Winnipeg, Canada. Large box of different grains and grasses of Canada.

Shredded Wheat Company, Fourteenth and Union Streets, Oakland, California. Large cardboard with mounted bottles.

Leather

Burlington Shoe Factories, Burlington, New Jersey.

Lynn Boot and Shoe Manufacturing Company, Lynn, Massachusetts.

Walk-Over Shoe, George E. Keith Company, Campello, Massachusetts. Box showing development of a shoe, leather, etc.

Limestone

Indiana Quarries Company, 112 West Adams Street, Chicago, Illinois. Samples of Bedford limestones.

Lumber

Bureau of Forestry, Washington, D. C.

Paper

Thomas Phillips Paper Mills, Akron, Ohio.

Strathmore Paper Company, Mittineague, Massachusetts. Exhibit of bottled pulp, etc.

Pencils

Eberhard Faber, 37 Greenpoint Avenue, Brooklyn, New York. Complete exhibit.

Pottery

Clay Products Company, Trenton, New Jersey.

Rice

Rice Association of America, Crowley, Louisiana. Exhibit.

Rope and hemp

Plymouth Cordage Company, West Plymouth, Massachusetts. Complete exhibit.

Tubbs Cordage Company, San Francisco, California. Exhibit of manila hemp.

Rubber

Firestone Tire Company, South Akron, Ohio.

Goodyear Rubber Company, Akron, Ohio. Exhibit.

United States Rubber Company, Philadelphia, Pennsylvania.

Salt

Colonial Salt Company, Barberton, Ohio.
Worcester Salt Company, 71 Murray Street, New York City.

Silk

Belding Brothers Silk Company, 130 Sutter Street, San Francisco, California. Complete exhibit case showing evolution of silkworm ($2.50).

Corticelli Silk Company, 371 West Adams Street, Chicago, Illinois; or Florence, Massachusetts. Complete exhibit from cocoon to silk ($2.50).

Soap

Peet Brothers Manufacturing Company, West Berkeley, California. Exhibit.

Sponges

Meyer Brothers, Wholesale Druggists, St. Louis, Missouri. Samples.

Steel

Bureau of Mines, Duluth, Minnesota.
Mesabi Iron Mines, Pittsburgh, Pennsylvania.

Sugar

American Sugar Refining Company, New York City.
Beet Sugar Refining Company, Saginaw, Michigan.
California-Hawaiian Sugar Company, Crockett, California.
Spreckles Sugar Company, 2 Pine Street, San Francisco, California.

Thread

American Thread Company, Willimantic, Connecticut.

Turpentine

Savannah Turpentine Refineries, Savannah, Georgia.

Wool

Knoxville Woolen Mills, Knoxville, Tennessee.
Lion Yarn Company, 408 Broadway, New York City.
American Woolen Company, 1 Federal Street, Boston, Mass.

Commercial Houses Handling Exhibits, Models, and Specimens (Partial List)

Denoyer-Geppert Company, 5235–5257 Ravenwood Avenue, Chicago, Illinois.

Anatomical models: eye, ear, head, teeth, heart, etc.
Museum preparations of plant and animal life: mounted birds, insects, flower specimens, and enlarged models of flowers.

General Scientific Company, 460 East Ohio Street, Chicago, Illinois.

Anatomical models etc.
Mounted specimens of insects, butterflies, moths, etc.

Commercial Museum of Philadelphia, Pennsylvania.

Mounted industrial exhibits, arranged in an artistic cabinet.

IV. STEREOGRAPHS AND STEREOSCOPES

Keystone View Co., Meadville, Pennsylvania.

Stereographs (plain, 24⅓ cents; colored, 60 cents).
- Classified sets for geography, history, and general science for intermediate and grammar grades; include 600 in the set with teacher's guides.
- Classified primary set includes 300 stereographs with teacher's guide.
- Large unclassified collection for history, geography, and nature study; descriptive text on back. See general catalogue.

Stereoscopes ($1.75).
Oak cabinets, arranged to hold either 600 or 300 stereographs, with base ($18.50).
Steel cabinets, as above, in olive-green finish ($25.00 per section, with base $10.00 extra).

Visual Education Service, Inc., 7024 Melrose Avenue, Los Angeles, California.

Stereographs (plain, 45 cents; colored, 75 cents).
- Shore and sea life in color; remarkable stereographs of sea urchins, sea anemones, starfish, clams; taken under water.
- Wild flowers of California in color; excellent work.

V. STEREOPTICON SLIDES

(This is a partial list only. See also in this Appendix, VIII, Projection lanterns for slides or opaque objects, p. 442.)

Academy of Science (F. M. Woodruff, curator), Chicago, Illinois. Birds and flowers.

American Museum of Natural History, New York City. Slides may be made to order for schools only; excellent colored slides for geography, history, and science.

Asahel Curtis Photo Company, 625 Colman Building, Seattle, Washington. Excellent colored slides of scenes of the Pacific Northwest ($1.00 each or one hundred and twenty slides for $110.00.)

Detroit Publishing Company, Detroit, Michigan. Slides for descriptive or industrial geography, history, art, and architecture (plain, 50 cents; hand-colored, $2.00; 25% discount to schools); collection includes all countries.

DeVry Corporation, 1091 Center Street, Chicago, Illinois. Special sets of slides for primary instruction accompanied by manuals and study cards; plain or colored.

George Kanzee, 12 Geary Street, San Francisco, California. Plain or colored slides for geography and art.

Keystone View Co. All types of slides can be purchased singly or in sets (plain, 45 cents; colored, $1.20); descriptive texts supplied.

Lick Observatory, Mt. Hamilton, California. Astronomy slides.

National Association of Audubon Society, New York City. Birds of America in color.

National Geographic Society, Washington, D. C. Many of the pictures in the *National Geographic Magazine* may be reproduced in a slide. Slides are furnished as a matter of educational service and only special orders are made up (75 cents).

John D. Scott, 106 West Fifty-second Street, New York City. Slides of masterpieces in art.

Shaw Laboratory, California Street, San Francisco, California.

The University Prints, Newton, Massachusetts. Slides made from originals of the University Prints (50 cents).

Visual Education Service, Inc., 7024 Melrose Avenue, Los Ange-

les, California. Biology, sea life, and California wild flowers (plain, 75 cents; colored, $1.50).

Edward Van Altena, 29 West Thirty-eighth Street, New York City. Slides of masterpieces.

W. M. Welsh Manufacturing Company, 1516 Orleans Street, Chicago, Illinois. Scientific slides.

VI. FILM SLIDES

(These may be used for work in agriculture, geography, history, health, biology, and nature study. See also in this Appendix, VIII, Projectors for film slides and film-slide attachments, pp. 442–443.)

Standard-width film, $1\frac{3}{8}''$

Bray Screen Products, Inc., 130 West Forty-sixth Street, New York City.

Society for Visual Education (Picturols), 227 South La Salle Street, Chicago, Illinois.

Spencer Lens Company, 442 Niagara Street, Buffalo, New York.

Stillfilm, $2\frac{1}{4}''$ *width*

The Stillfilm Company, 1052 Cahuenga Avenue, Hollywood, California.

VII. MOTION PICTURES

Brief List of Educational Institutions that either rent or lend Slides and Motion Pictures to Schools [1]

California

University of California, Berkeley.

Colorado

University of Colorado, Boulder.

Florida

University of Florida, Gainesville.

Illinois

Harris Extension to Field Museum, Chicago.

Indiana

University of Indiana, Bloomington.

[1] For complete list of all types of motion pictures see classified catalogue, "1001 Films," published by the *Educational Screen* magazine, 5 South Wabash Avenue, Chicago, Illinois.

Iowa
Iowa State College, Ames.
Kansas
University of Kansas, Lawrence.
Kentucky
University of Kentucky, Lexington.
Louisiana
Louisiana State Normal School, Natchitoches, Louisiana.
Massachusetts
State Department of Education, Boston.
Minnesota
University of Minnesota, Minneapolis.
Missouri
University of Missouri, Columbia.
St. Louis Commercial Museum, St. Louis.
Nebraska
University of Nebraska, Lincoln.
New York
State Educational Department, Albany.
American Natural History Museum, New York City.
Bureau of Public Health, New York City.
North Carolina
State Department of Education, Raleigh.
North Dakota
North Dakota Agricultural College, Fargo.
Ohio
University of Ohio, Columbus.
State Department of Visual Instruction, Columbus.
Oklahoma
University of Oklahoma, Norman.
Oregon
University of Oregon, Eugene.
Pennsylvania
Philadelphia Commercial Museum, Philadelphia.
Texas
University of Texas, College Station.
Utah
University of Utah, Salt Lake City.

Washington
Washington State College, Pullman.
Washington, D.C.
Childrens' Bureau.
United States Bureau of Mines.
United States Department of Agriculture.
United States Department of Education.
Wisconsin
University of Wisconsin, Madison.

Brief List of Commercial and Industrial Institutions which lend Slides and Films to Schools

American Optical Company, Southbridge, Massachusetts. Care of the eyes.

Amoskeag Manufacturing Company, Manchester, New Hampshire. Cotton and wool industries.

Armour Packing Company, Chicago, Illinois. Meat-packing industry.

Borden Milk Company, 108 Hudson Street, New York City. Dairying industry.

Buick Motor Company, Flint, Michigan. Automobile industry.

Burroughs Adding Machine Company, Detroit, Michigan. Adding machines.

Canadian Pacific Railroad Company, Montreal, Canada. Scenic slides and films.

Carnation Milk Products Company, Seattle, Washington. Dairy industry.

Corticelli Silk Company, 371–373 West Adams Street, Chicago, Illinois. Silk industry.

Denver and Rio Grande Railroad, Denver, Colorado. Scenic slides and films.

Doubleday, Doran & Company, Garden City, New York. Bookmaking industry.

Eastman Kodak Company, Rochester, New York. Welfare and film industry.

Firestone Tire and Rubber Company, Akron, Ohio. Automobile industry.

General Electric Company, Schenectady, New York. Wheat, wool, cotton, transportation, and electricity, light, wireless, motors, batteries, life of Edison.

Ginn and Company, Boston, Massachusetts. Bookmaking industry.

Great Northern Railroad Company, St. Paul, Minnesota. Scenic films.

International Harvester Company, Chicago, Illinois. Farming and dairying.

Libby, McNeal and Libby, Chicago, Illinois. Food products.

Long-Bell Lumber Co., R. A. Long Building, Kansas City, Missouri. Lumber industry.

Moto-Meter Co., Long Island, New York. What every car-owner should know.

National Cash Register Company, Dayton, Ohio. Welfare and safety-device films.

Pacific Telephone and Telegraph Company, 195 Broadway, New York. History of telephone and communication.

Packard Motor Car Company, Detroit, Michigan. Automobile industry.

Santa Fe Railway Company. Scenic slides and films.

Union Pacific Railway Company, Chicago, Illinois. Scenic films.

VIII. PROJECTION EQUIPMENT. (Partial List of Dealers)

Projection lanterns for slides or opaque objects. (See Fig. 55.)

Bausch and Lomb Optical Company, 623 St. Paul Street, Rochester, New York (branches: New York, Chicago, San Francisco, Washington, Boston).

Keystone View Co., Meadville, Pennsylvania (see Figs. 57 and 81).

E. Leitz, Inc., 60 East Tenth Street, New York City (85 Third Street, San Francisco, California).

Spencer Lens Company, 19 Doat Street, Buffalo, New York (branches: New York, Chicago, San Francisco, Boston, Washington).

Projectors for film slides

Brayco, Bray Screen Products, Inc., 130 West Forty-sixth Street, New York City.

Society for Visual Education, 327 South La Salle Street, Chicago, Illinois.

Spencer Lens Company.

Film-slide attachments. (Attachments made to fit on any standard make of projection lantern)

Bausch and Lomb Optical Company (see Fig. 66).

Spencer Lens Company.

Stillfilm Company, Hollywood, California. A slide-carrier for 2¼″ film (see Fig. 68).

Motion-picture projectors[1]

Professional standard (see Fig. 74).

Simplex Projection Company, 30 West Forty-sixth Street, New York City.

Powers-Nicholas Power Company, 90 Gold Street, New York City.

Semiportable (see Fig. 75).

Acme Motion Picture Company, S. V. E. Model, 1030–1036 West Austin Avenue, Chicago, Illinois.

DeVry Corporation, Super DeVry, 1091 Center Street, Chicago, Illinois.

Holmes Projector Company, 718 North Curtis Street, Chicago, Illinois.

Pathéscope Company of America, 35 West Forty-second Street, New York City.

Zenith Safety Projector Company, 310–320 West Second Street, Duluth, Minnesota.

Portable projectors (see Figs. 76 and 77).

Acme Motion Picture Company.

Capitol Projector Company, 133 West Washington Street, Chicago, Illinois.

DeVry Corporation.

Projectors for narrow-width film

Bell and Howell Company, 1801 Larchmont Avenue, Chicago, Illinois.

[1] The list of projectors given here is limited by the lack of space. There are other projectors on the market today which are rendering good service (see page 206).

DeVry Corporation.
Eastman Kodak Company, Rochester, New York. "Kodascope" for 16-millimeter film.

IX. PROJECTION SCREENS

(For slides and motion pictures. See page 173.)

Acme Metallic Screen Company, New Washington, Ohio.
American Lux Products Company, 50 East Forty-second Street, New York City (daylight screen).
Bausch and Lomb Optical Company (daylight and metallic surfaced screens).
Da-Lite Screen and Scenic Company, 922–924 West Monroe Street, Chicago, Illinois.
Raven Screen Corporation, 1476 Broadway, New York City.
Spencer Lens Company (daylight screen and metallic surfaced screens).

The following information regarding sizes and prices may be of service:

Screens made of heavy cloth, plain-coated and usually mounted on spring rollers

Size	Average Price
$4\frac{1}{2}$ ft. × $4\frac{1}{2}$ ft.	$7.00
6 ft. × 6 ft.	8.50
9 ft. × 9 ft.	24.00
12 ft. × 12 ft.	55.00

Screens made of heavy material with aluminum surface

Size	Average Price
6 ft. × 6 ft.	$11.50
9 ft. × 9 ft.	30.00
12 ft. × 12 ft.	65.00

Translucent screens for daylight projection

Size	Average Price
24″ × 30″	$20 to 25.00
30″ × 36″	37.50
50″ × 60″	87.50

X. PORTABLE BOOTHS

George Howard Inc., Mt. Vernon, New York. Sheet metal.

Johns-Mansville Co., New York City (branches in many large cities). Asbestos cloth and sheet metal.

United Theater Equipment Corporation, New York City.

XI. REWINDS FOR FILMS[1]

Acme Motion Picture Company, 1030–1036 West Austin Avenue, Chicago, Illinois.

Bell and Howell Company, 1801 Larchmont Avenue, Chicago, Illinois.

Combination rewinder and splicer, narrow width.

XII. PROJECTION TABLES FOR SLIDE LANTERNS AND PORTABLE MOTION-PICTURE PROJECTORS

Bausch and Lomb Optical Company. Folding lantern table 47″ high, with wooden top 32″ × 19″ ($27.50).

Spencer Lens Company. Substantial table 44″ high, with oak top 16″ × 32″, iron frame ($35). Light weight iron table with wooden top and shelf (see Fig. 64).

XIII. PROJECTION LAMPS FOR LANTERNS AND MOTION-PICTURE PROJECTORS

Bausch and Lomb Optical Company (any branch).

General Electric Company (any branch).

Spencer Lens Company (any branch).

Size	Price
400 watt tungsten filament, such as the Mazda	About $3.65
500 watt tungsten filament, such as the Mazda	About $5.30
1000 watt Mazda (spherical)	About $8.35
1000 watt Mazda (tubular)	About $7.80

[1] All projection equipment such as rewinds, projection tables, electric bulbs, screens, and the like may be purchased ordinarily from any projection dealer. The dealers named above are quoted only for the purpose of giving teachers a little definite information as a guide. General catalogues will be supplied by all established firms.

XIV. STEREOPTICON SLIDE CARRIERS

(Carried by all projection dealers.)

Bausch and Lomb Optical Company.
Spencer Lens Company.

Size	Price
$3\frac{1}{4}'' \times 4''$ with automatic elevating device	$2.00
Double-slide carriers for either $3\frac{1}{4}'' \times 3\frac{1}{4}''$ or $3\frac{1}{4}'' \times 4''$	2.75
Rapid-changing slide-carrier	5.00

XV. STEREOPTICON SLIDE BOXES

Keystone View Co.
Spencer Lens Company.

Capacity	Price
50 slides (oak case)	$1.50 to $2.50
50 slides (oak case)	1.75 to 3.50
100 slides (oak case)	2.00 to 6.00

APPENDIX B

SPECIAL LIST OF VISUAL MATERIALS APPLIED TO THE STUDY OF SPECIFIC SUBJECTS

I. GEOGRAPHY [1]

National Geographic Magazine pictures suitable for reference and mounting. (See page 76–80)

Africa: February, 1925.
- Algeria: January, 1914; February, 1928 (32 illustrations in color).
- Egypt: March, 1917; May, 1923; March, 1926.
- Jungle Folks: February, 1928.
- Morocco: March, 1925.
  - North and central: October, 1922.
- Tripoli: August, 1925 (color).

Asia
- Afghanistan: January, 1921.
- Arabia: December, 1914; November, 1919; May, 1923.
- Armenia: November, 1919.
- Asia Minor (Palestine): March, 1914; November, 1922; May, 1923; October, 1924.
- Jerusalem: December, 1927 (27 colored illustrations).
- Central Asia (nomad life): October, 1927.
- Ceylon: February, 1912 (70 illustrations).
- China: November, 1920 (color); May, 1922; April, 1927; June, 1927.
  - Mongolia: May, 1921.
  - Nashi of Yunnan: November, 1924.
  - Tibet: September, 1921; September, 1925.
  - Yunnan Province: November, 1924; April, 1925.

[1] For general list of commercial dealers handling flat pictures, industrial, exhibits, charts, globes, maps, stereographs, still films, slides, and motion pictures, see classified list in Appendix A.

India: February, 1912; November, 1921 (color); November, 1924.
Japan: July, 1914; July, 1921; September, 1922; October, 1923; April, 1924.
Near East: October, 1918; November, 1925 (52 illustrations in color).
Mesopotamia: December, 1914; February, 1916; April, 1922 (16 illustrations in color).
Persia: April, 1921 (color).
Siberia: December, 1920.
Singapore: March, 1926.

Australia
Australia: December, 1916; March, 1924.
New Zealand: August, 1925.

Europe
Albania: February, 1912; November, 1912; August, 1918.
Austria: December, 1912; April, 1915; January, 1923.
Belgium: September, 1914; May, 1917; May, 1924.
Bohemia: February, 1917.
Bulgaria: April, 1915; February, 1921.
Cathedrals of Europe: July, 1922.
Constantinople Today: December, 1914; June, 1922.
Corsica: September, 1923.
Czechoslovakia: March, 1917; February, 1921; June, 1927 (19 color plates).
Denmark: August, 1922.
England: September, 1915; August, 1920.
Cornwall: December, 1924.
London: May, 1922; December, 1924.
Orkney and Shetland Islands: February, 1921.
Finland, Helsingfors: May, 1925 (20 illustrations in color).
France: November, 1915; July, 1921; November, 1924 (color).
Alsace: July, 1927 (11 illustrations in color); August, 1927 (color).
Palace of Versailles: January, 1925 (color).
Germany: September, 1908; March, 1923; July, 1925; February, 1926 (color).

Greece: October, 1915; December, 1922.
Holland: September, 1908; December, 1910; November, 1914; January, 1915; June, 1916; March, 1923.
Hungary: October, 1914.
Ireland and Wales: April, 1915; March, 1927 (color).
Italy: June, 1915; October, 1916; April, 1924; April, 1928 (color).
Capri: June, 1922.
Rome: November, 1915.
Sicily: October, 1927 (22 colored illustrations).
Venice: June, 1915; May, 1922.
Norway: June, 1924.
Portugal: November, 1922 (color); November, 1927 (17 colored illustrations).
Rumania: March, 1926.
Russia: November, 1914 (color).
Sardinia: January, 1923 (color); April, 1926 (color).
Spain: August, 1924.
Switzerland: July, 1911; November, 1915.
Islands of the Pacific and West Indies
Bali: March, 1928 (color).
Hawaiian Islands: February, 1924 (color).
Islands of the Pacific: December, 1921; February, 1928.
Jamaica: January, 1927 (11 colored plates).
Papua: January, 1927 (22 colored plates).
South Sea Islands: October, 1919 (color); October, 1925.
Sumatra: January, 1920.
Tahiti: October, 1920.
North America: April, 1922 (color).
Arctic regions
Eskimo life: June, 1917; April, 1920; February, 1920; June, 1925.
Greenland: March, 1926 (16 pages in color).
Iceland: April, 1928 (39 pages in color).
Canada: March, 1916.
Rockies: April, 1925.
Central America: February, 1922; January, 1925.
Panama Canal: February, 1914.

Mexico: September, 1910; May, 1914; November, 1922; March, 1923 (color); May, 1927.

United States

Marvels of the West: June, 1928.

Maryland: February, 1927 (18 illustrations in color).

Michigan: March, 1928.

National parks: June, 1920; April, 1923 (16 illustrations in color).

Southwest states (historic): September, 1925 (22 illustrations in color).

Texas: June, 1928.

Vermont: March, 1927 (color).

Washington, D.C.: March, 1915; June, 1923 (color).

South America

Argentina, Ecuador, Colombia: October, 1921.

Bolivia: February, 1927 (18 natural color plates).

Chile: September, 1922.

Peru: May, 1916.

Valley of the Amazon: April, 1926.

West Indies: February, 1922.

Porto Rico: December, 1924 (full color).

See also sections of Appendix A dealing with prints (p. 427), stereographs (p. 437), and slides (pp. 438 and 439).

II. HISTORY AND CIVICS

Motion pictures (A brief list) [1]

Title	Distributor
Abraham Lincoln	Rockett
Canals in United States History	Society for Visual Education
Chronicles of America Photoplays	Yale University Press, New Haven, Connecticut
A Citizen and his Government	Society for Visual Education
English Settlements in North America	Society for Visual Education

[1] For complete list of films such as "Ruins of Rome, Egypt, Pompeii, Venice, Greece," "Robin Hood," "The Covered Wagon," see "1001 Films" catalogue, published by the *Educational Screen*, 5 South Wabash Avenue, Chicago, Illinois.

French Explorations in North America	Society for Visual Education
Growth of Cities and their Problems	Society for Visual Education
Hats Off	Society for Visual Education
History of Light	General Electric Company, Schenectady, New York
Immigration to the United States	Society for Visual Education
King of the Rails	General Electric Company
Landmarks of Early American Revolution	Ford Motion Picture Laboratory, Detroit, Michigan
Landmarks of Early Exploration and Settlement in North America	Ford Motion Picture Laboratory
Louisiana Purchase and Lewis and Clark Expedition	Society for Visual Education
Old Glory	Besseler Educational Film Company, New York
Panama Canal	General Electric Company
Paul Revere's Ride	George Kleine, 111 S. Michigan Avenue, Chicago, Illinois
Queen of the Waves	General Electric Company
Representative Democracy in United States	Society for Visual Education
Settling the Ohio Valley	Society for Visual Education
Steamboats in United States History	Society for Visual Education
Territorial Growth of United States	Ford Motor Company, Detroit, Michigan
Thomas Edison	General Electric Company
Waste Disposal in Cities	Society for Visual Education
What Uncle Sam can do for Two Cents	Ford Motor Company

National Geographic Magazine pictures suitable for reference and mounting. (See also geography list.)

Aircraft: July, 1924 (110 illustrations); January, 1925; January, 1926; August, 1927.

Ancient Egypt: March, 1917; October, 1922; May, 1923; March, 1926.
Ancient Greece: October, 1915; December, 1922.
Ancient and modern Rome: November, 1915; June, 1922.
Automobile industry: October, 1923.
Fish and fisheries: December, 1923.
History of railroads: April, 1923.
Immigration to the United States: February, 1917.
Indians: (Crows of Black Hills in color) September, 1927.
Palestine: March, 1914; October, 1924.
Panama Canal: September, 1916.
Ruins of Tigris and Euphrates: February, 1916; April, 1922.

Stereographs and slides. (See general list in Appendix A.)

Historical settings and ruins of America, Europe, Egypt and West Asia.
  Keystone View Company, Meadville, Pennsylvania.
  Detroit Publishing Company, Detroit, Michigan.
    Slides of American historical places.
  Publishers' Photo Service, Inc., New York City.
    Slides of historical places of the world.

III. NATURAL SCIENCE

National Geographic Magazine pictures suitable for reference and mounting

ANIMALS (colored)

Cattle of the world: December, 1925 (20 pages in color).
Deer, moose, beaver, wolves, etc.: August, 1921.
Dogs: March, 1919 (32 pages in color).
Horses: November, 1923 (30 pages in color).
Larger North American mammals: November, 1916 (32 pages in color).
Prehistoric animals: May, 1919.
Prehistoric man and animals: February, 1916.
Sheep: April, 1928 (20 pictures).
Smaller North American mammals: May, 1918 (32 pages in color).

BIRDS (mostly colored)

American birds (in color): June, 1913; May, 1914.
  Bird life among lava rock and coral sand: July, 1925.
  Game birds: August, 1915; April, 1915.
  Warblers: April, 1917; December, 1920.
Birds: Holidays with Humming Birds: June, 1928.
Birds of the South Seas: October, 1925 (16 pages in color).
Ducks of Lake Merritt: October, 1919.
Falconry, a sport of kings: December, 1920 (12 pages in color).
Pigeons: January, 1926 (16 reproductions of paintings).

FISH

Fish: January, 1921 (color).
Fish and fisheries: December, 1923 (35 illustrations plain).
Fish of the warm sea: January, 1922 (color).
Goldfish and their cultivation: October, 1924 (8 pages in color).
Marine Life of Florida Keys: January, 1927 (8 colored plates).
North Atlantic food fish: December, 1923 (16 pages in color).
Sea Life: September, 1927 (8 colored plates).

FLOWERS AND PLANT LIFE

Fantastic plants of our western desert: January, 1924 (plain).
Ferns: May, 1925 (16 pages in color).
Flowers of America: July, 1925 (55 reproductions of paintings).
Flowers of the American Desert: September, 1925 (color).
Grasses and their flowers: June, 1921 (8 pages in color).
Leaves: February, 1919 (color).
Midsummer wild flowers: July, 1922 (color).
Mushrooms: May, 1920 (color).
Our big trees: January, 1917 (black and white).
Our national parks: June, 1920 (color).
Plant life: June, 1924 (black and white).
Wild flowers of America: May, 1915 (16 pages in color).
Wild flowers of America: June, 1916 (in color); June, 1917.
Wild state flowers: June, 1917 (color).

Miscellaneous

Astronomy: August, 1919 (21 illustrations).
Ants: August, 1912 (33 illustrations, black and white).
Butterflies: July, 1927 (16 pages, full color).
Clouds: August, 1925 (33 illustrations, black and white).
Domestic fowl: April, 1927 (29 colored plates of chickens).
Magic beauty of snow and dew: January, 1923 (9 illustrations).
Moths and butterflies: July, 1914; July, 1927 (16 colored plates).
Snow scenes: February, 1920 (black and white).
Waterfalls of the world: September, 1920 (16 illustrations).

Nature Magazine

This is published by the American Nature Association, Washington, D.C. Subscription, $3.00 per year. Every magazine contains one colored picture for mounting besides many black-and-white pictures throughout each month's issue; an excellent magazine for children and adults.

Masterpieces in painting.[1] (A list of masterpieces in painting which may be used effectively in nature-study lessons)

ANIMALS (for Primary Grades)

Title	Artist
The Cat Family	Julius Adam
Four Kittens	Julius Adam
After a Banquet (mother and kittens)	Lambert
Cat and Kittens	Lambert
"Pals" (child and kitten)	Jessie Willcox Smith
"I Like Little Pussy"	Jessie Willcox Smith
Portrait of Herself (with a cow)	Rosa Bonheur
Milking Time	Dupré
On the Prairie (cow drinking)	Dupré
The Young Bull	Paul Potter
Upland and Sky (cows resting)	Adrian Stokes
Deer	Rosa Bonheur
A Deer Family	Rosa Bonheur
The Sanctuary (deer)	Landseer
The Monarch of the Glen	Landseer

[1] For commercial dealers see classified list in Appendix A.

Title	Artist
"Can't You Talk?" (child and dog)	Holmes
"Kiss Me" (girl and dog)	Holmes
A Distinguished Member of the Human Family (dog)	Landseer
A Blockade (dogs and kittens)	Briton Riviere
Suspense (large dog)	Landseer
Her Only Playmates	Hardy
The Dog in the Manger	Hunt
Donkey in the Stable	Rosa Bonheur
Meditation (donkey)	Rosa Bonheur
The Frugal Meal (horses)	Herring
Mother and Son (horse and colt)	Davis
A Noble Charger (horse's head)	Rosa Bonheur
Shoeing the Horse	Landseer
Village Blacksmith	Herring
Pharaoh's Horses (horses' heads)	Herring
Waiting for Mistress (horse and dogs)	Landseer
Three Members of a Temperance Society (horses drinking)	Herring
Lion of Lucerne (sculpture)	Thorvaldsen
Lions at Home	Rosa Bonheur
Boy and Rabbit	Raeburn
Flock of Sheep (spring)	Mauve
Sheepfold	Jacque
Shepherdess	Lerolle
Lost (sheep in a storm)	Schenck
Evening (sheep and shepherdess)	Le Rolle
Saint John and the Lamb	Murillo
The Divine Shepherd	Murillo
The Piper and the Nutcrackers	Landseer
Squirrels	Carter
The Lone Wolf	Kowalski

MISCELLANEOUS

Feeding the Hens	Millet
A Girl with a Dove	Greuze
The Pet Bird	Meyer Von Bremen
The Man with the Hoe	Millet

Title	Artist
The Gleaners	Millet
The Sowers	Millet
The Haymakers	Dupré
June in the Austrian Tyrol	Macwhirter
Return to the Farm	Troyon
The Farmerette	Jessie Willcox Smith
Spring	Knaus
The Oaks	Van Ruysdael
Autumn Gold	George Innes
Pasturage in a Forest	Jacque
June Clouds	William Morris Hunt
Spring	Corot
The Lake	Corot
Avenue of Trees	Hobbema
Carnation, Lily, Lily, Rose	Sargent
Five Senses	Jessie Willcox Smith
"Roly, Poly" (pumpkins)	Jessie Willcox Smith
Rain, Rain, Go Away	Jessie Willcox Smith
Among Autumn Leaves	Jessie Willcox Smith
Springtime	Jessie Willcox Smith
Tulip Time	Jessie Willcox Smith
Rosebuds	Jessie Willcox Smith
Blossoms	Jessie Willcox Smith
Butterflies	Jessie Willcox Smith
The Wind	Ruth Mary Hallock
The Rain	Ruth Mary Hallock

Nature poems for children. (These may accompany the paintings above.)

ANIMALS

Poem	Author	Book
To Pussy White	Charles Keeler	Songs of Childhood
I Love Little Pussy	Jane Taylor	St. Nicholas Book of Verse
Pussy	Clinton Scollard	St. Nicholas Book of Verse
The Cow	Stevenson	A Child's Garden of Verses
Milking Time	Christina Rossetti	Graded Memory Selections
The Lamb	Blake	Graded Memory Selections
Patsy the Calf	Lindsay	Graded Memory Selections
The Chicken's Mistake	Phœbe Cary	Nature in Verse
Mr. Duck and Mr. Turkey	Neidlinger	
The Pet Rabbit	Robert E. Mack	Child's Harvest of Verses
The Dog	Charles Keeler	Songs of Childhood

Poem	Author	Book
My Donkey	Charles Keeler	Songs of Childhood
The Coyote	Charles Keeler	Songs of Childhood
The Squirrel	Charles Keeler	Songs of Childhood

BIRDS

Poem	Author	Book
The Brown Thrush	Lucy Larcom	Graded Memory Selections
The Bluebird's Song		Graded Memory Selections
Nest Eggs	Stevenson	A Child's Garden of Verses
Suppose	Alice Cary	Nature in Verse
O Lark of the Summer Morning		Nature in Verse
A Happy Bird		Nature in Verse
The Hidden Songster		Nature in Verse
Who Stole the Bird's Nest?	L. M. Child	Nature in Verse
The Crested Jay	Charles Keeler	Songs of Childhood
The Road Runner	Charles Keeler	Songs of Childhood
The Burrowing Owl	Charles Keeler	Songs of Childhood
The Blue Bird		Poems by Grades
The Sparrow's Nest		Poems by Grades
Two Wise Owls		Nature in Verse
Birdies' Secret	Tappan	St. Nicholas Book of Verse
A Spring Lesson (Robin)	Halley	St. Nicholas Book of Verse
A Bird Call	Catfield	St. Nicholas Book of Verse

FLOWERS

Poem	Author	Book
Daffodils	Wordsworth	Graded Memory Selections
Dandelion	N. M. Garabrant	Nature in Verse
Chorus of the Flowers	Lucy Wheelock	Nature in Verse
Forget-me-not		Nature in Verse
The Pussy Willow		Nature in Verse
Daisies	Sherman	St. Nicholas Book of Verse
Goldenrod	Lovejoy	Nature in Verse
The Columbine	Charles Keeler	Songs of Childhood
Buttercups	Charles Keeler	Songs of Childhood
Johnny Jump Up	Charles Keeler	Songs of Childhood
The Trillium	Charles Keeler	Songs of Childhood
Baby Blue Eyes	Charles Keeler	Songs of Childhood
To a Wild Rose	Charles Keeler	Songs of Childhood

INSECTS

Poem	Author	Book
The Ant an Engineer		Nature in Verse
The Busy Bee	Isaac Watts	Nature in Verse
Honey Bee	Lucy Fitch Perkins	St. Nicholas Book of Verse
The Bumble Bee	Riley	Graded Memory Selections
To a Honey Bee	Alice Cary	Graded Memory Selections
The Funny Fiddler (cricket)	Henrietta Eliot	St. Nicholas Book of Verse
The Song of the Bee	Marian Douglas	St. Nicholas Book of Verse
The Spider and the Fly	Mary Howitt	Nature in Verse
The Shining Web		Nature in Verse

TREES

Poem	Author	Book
Trees	Joyce Kilmer	For the Children's Hour
How the Fir Tree became a Christmas Tree		For the Children's Hour
Autumn Leaves	George Cooper	Nature in Verse
October's Party (and other months)		Nature in Verse
A Chance		Nature in Verse
The Little Red Apple Tree	Riley	St. Nicholas Book of Verse
The Little Leaf	Hartswick	St. Nicholas Book of Verse
The Little Pine Tree	Burnstead	Nature in Verse
The Hayloft	Stevenson	A Child's Garden of Verses
Farewell to the Farm	Stevenson	A Child's Garden of Verses

MISCELLANEOUS

Poem	Author	Book
The Wind	Stevenson	A Child's Garden of Verses
Rain	Stevenson	A Child's Garden of Verses
Rain in Summer	Longfellow	Nature in Verse
Who likes the Rain	Bates	Nature in Verse
April Showers		Nature in Verse
Merry Rain		Nature in Verse
A Rainy Day	Sylvester	St. Nicholas Book of Verse
Listen to the Rain	Mackay	St. Nicholas Book of Verse
When the Wind Blows	J. E. McCann	St. Nicholas Book of Verse

Poem	Author	Book
Blow, Wind, Blow	E. S. Bumstead	St. Nicholas Book of Verse
Who has Seen the Wind?	Rossetti	St. Nicholas Book of Verse
The First Snowfall	Lowell	Graded Memory Selections
The Frost	Hannah F. Gould	Nature in Verse
The Brook	Tennyson	Graded Memory Selections
Sun Travels	Stevenson	Graded Memory Selections
Sunbeams		Nature in Verse
The First Snow		Nature in Verse

Books containing selections or pictures listed above

BAILEY, C. S. For the Children's Hour. Milton Bradley Company.

BURT, MARY E. Poems that Every Child should Know. Doubleday, Doran and Company, Inc.

EDDY, SARAH J. Friends and Helpers. Ginn and Company.

FISH, HELEN D. The Boys' Book of Verse. Frederick A. Stokes Company.

HARRIS, A. V. and GILBERT, C. B. Poems by Grades. Charles Scribner's Sons.

LOVEJOY, MARY. Nature in Verse. Silver, Burdett and Company.

ST. NICHOLAS BOOK OF VERSE. The Century Co.

UNTERMEYER, LOUIS. This Singing World. Harcourt, Brace and Company.

WATERMAN, S. D., and Others. Graded Memory Selections. Educational Publishing Company.

The Nature Library. An illustrated reference book, with colored plates of birds, flowers, trees, butterflies, and animals. Doubleday, Doran and Company, Inc.

Exhibits stereographs and slides. (See classified list in Appendix A.)

Motion pictures

Excellent films may be obtained from almost any state university or local distribution center on plant and animal life of all kinds, such as ants, spiders, flies, mosquitoes, animals of the jungle of Africa, birds of the arctic region, the development of plants and flowers, agriculture, and science of life. The list is too

long to quote here, and what may be obtainable at one available center may not be found in another.

See local catalogues of your state educational center and such distributors as Pathé and Kineto Companies and Eastman Teaching Films, Inc., who have produced some excellent nature material.

IV. THE FINE ARTS

Masterpieces in painting suitable for primary grades.[1] (Possible interests:[2] Mother Goose stories, fairy stories, animal and child life of all lands)

ANIMALS[3]

Artist	Title
Adams, Julius E.	The Cat Family, and others
Bonheur, Rosa	A Noble Charger (horse)
Bonheur, Rosa	Deer
Bonheur, Rosa	Meditation (donkey)
Dupré, Jules	Milking Time
Dupré, Jules	The Escaped Cow (for action)
Holmes	"Can't You Talk?" (girl and dog)
Holmes	"Kiss Me" (girl with kitten and dog)
Hunt, Walter	The Dog in the Manger (calves, puppy, and chickens)
Hunt, William Morris	The Belated Kid
Knaus	Young Kittens
Lambert, Louis Eugène	Cat and Kittens
Landseer	A Distinguished Member of the Humane Society (large dog)
Landseer	Piper and Nutcrackers (squirrels)
Landseer	Shoeing the Bay Mare
Landseer	The Sanctuary (one deer)
Mauve	Return of the Flock
Mauve	Spring
Mauve	Flock of Sheep

[1] For classified list of commercial dealers see Appendix A, p. 427.
[2] Art appreciation should be closely correlated with other school activities.
[3] See "Natural Science," p. 454.

Artist	Title
Mosler	De Profundis (horses plowing)
Potter, Paul	The Prairie (two cows)
Raeburn	A Boy with a Rabbit

MISCELLANEOUS

Artist	Title
Albright	Little Sister
Albright	End of the Pier
Geoffroy, Jean	Primary School in Brittany
Hallock, Ruth Mary [1]	The Wind, The Rain, and others
Hoecker, Paul	Dutch Girl with her Cat
Kevet	Mother and Children
Maes, Nicolaas	The Spinner
Millet	Feeding her Hens
Millet	The First Step
Millet	Woman Churning
Murillo	St. John and the Lamb
Pearson	Geese
Raphael	The Madonna of the Chair
Ruisdael, Jacob van	The Windmill
Smith, Jessie Willcox [1]	Mother Goose Pictures, The Five Senses, and others
Sully, Thomas	Boy with a Torn Hat
Van Dyck	Baby Stuart

ILLUSTRATED BOOKS

Artist	Title
Anderson, Anne	The Old Mother Goose Nursery Rhyme Book
Bosscher, Jean de	Gulliver's Travels
Crane, Walter	Cinderella's Picture Book
Chatterton, E. K.	Sailing Ships (100 illustrations)
Dunlap, Hope	The Pied Piper of Hamelin (Robert Browning)
Parrish, Maxfield	Poems of Childhood (Eugene Field)

[1] For kindergarten and first grade.

Artist	Title
Parrish, Maxfield	The Arabian Nights' Entertainment (edited by Kate Douglas Wiggin and Nora A. Smith)
Smith, E. Boyd	The Circus (Frederick A. Stokes Company)
Smith, Jessie Willcox	A Child's Book of Stories (selected and arranged by P. W. Coussens)
Smith, Jessie Willcox	Rhymes of Real Children (Betty Sage)

Grammar Grades. (Masterpieces in painting, sculpture, and architecture)[1]

MASTERPIECES TO CORRELATE WITH AMERICAN HISTORY

Prints of paintings

Artist	Title
Boyes, A. W.	Departure of the *Mayflower*
Barsse	Priscilla Spinning
Boughton, G. H.	John Alden and Priscilla
Boughton, G. H.	Early Puritans of New England
Boughton, G. H.	Pilgrims going to Church
Boughton, G. H.	Puritans' First Winter
Boughton, G. H.	Return of the *Mayflower*
Bicknell, Albin H.	Battle of Lexington
Blashfield, Edwin H.	Washington resigning his Commission
Carpenter	First Reading of the Emancipation Proclamation
Chapman, John G.	Baptism of Pocahontas
Copley, John Singleton	John Hancock
Cobb, Cyrus	Paul Revere's Ride
Elder, John	Robert E. Lee
Johnson, Eastman	Boyhood of Lincoln
Leigh	Rough Riders and The Retreat
Leutze, Emanuel	Washington crossing the Delaware
Millais, John Everett	Boyhood of Raleigh
Powell, William Henry	De Soto discovering the Mississippi

[1] See "The Fine Arts," p. 460.

Artist	Title
Rossiter	Washington and Lafayette at Mount Vernon
Stuart, Gilbert	Washington
Sully, Thomas	Portrait of Pocahontas
Trumbull, John	Declaration of Independence
Trumbull, John	Surrender of Burgoyne
Trumbull, John	Surrender of Cornwallis
Turner, Charles Y.	Opening of the Erie Canal
Vanderlyn, John	Landing of Columbus
Weir, Robert W.	Embarkation of the Pilgrims
West, Benjamin	Death of Wolfe
West, Benjamin	Penn's Treaty with the Indians
Willard, Archibald M.	The Spirit of '76

Statuary

Artist	Title
Ball, Thomas	Emancipation Proclamation
Bitter, Karl	Signing of the Louisiana Purchase Treaty
Borglum, Solon	The Pioneer
Borglum, Gutzon	Lincoln
Borglum, Gutzon	Roosevelt
Fraser, James Earl	End of the Trail
French, Daniel C.	Minute Man
French, Daniel C.	John Harvard
Houdan, Jean A.	Washington
Pelzer	Statue of Columbus
Saint-Gaudens, Augustus	Lincoln
Saint-Gaudens, Augustus	General Sherman
Saint-Gaudens, Augustus	The Puritan
Taft, Lorado	Black Hawk
Whitney, Anne	Leif Ericson

Architecture

Congressional Library, Washington, D.C.

Pueblos of the Southwest. See article on Taos and Hopi Indians in the *National Geographic Magazine*, April, 1916.

Lincoln Memorial. See *National Geographic Magazine,* August, 1922.

Maya Ruins of Mexico and Central America. See *National Geographic Magazine,* February, 1922.

Washington Capitol. See *National Geographic Magazine,* March, 1915; June, 1923.

Washington Monument

Woolworth Building, New York City

MASTERPIECES TO CORRELATE WITH OLD-WORLD HISTORY

Prints of paintings

Artist	Title
Abbey, Edwin A.	Holy Grail
Abbey, Edwin A.	Knights of the Round Table
Alma-Tadema	Reading from Homer
Beauneveu, André	King Richard II
Bastien-Lepage, Jules	Joan of Arc
Bayeux Tapestry	The Ride of Harold
Bayeux Tapestry	The Surrender of the Keys to William
Bayeux Tapestry	Taking of the English Throne by Harold
David	Napoleon on Horse
Dürer	Adoration of the Magi
Fra Angelico	The Flight into Egypt
Giorgione	Portrait of a Cavalier
Hals, Frans	Laughing Cavalier
Hals, Frans	The Jester
Holbein	Henry VIII
Leighton, Sir Frederick	Greek Girls playing Ball
Lebrun (née Vigée)	Marie Antoinette
Maccari, Cesare	Cæsar's Oration against Catiline
Mantegna	Triumph of Cæsar
Munkácsy, Mihaly	Blind Milton dictating *Paradise Lost*
Nikolaki, Z. P.	Joan of Arc
Orchardson, Sir W. Q.	Napoleon on Board the *Bellerophon*
Raphael, Sanzio	St. George and the Dragon
Raphael, Sanzio	The Flight of Æneas

Artist	Title
Regnault, Henri	Automedon with the Horses of Achilles
Rembrandt	The Night Watch
Rivière, Briton	Circe and the Companions of Ulysses
Rivière, Briton	Daniel in the Lion's Den
Pinturicchio	Return of Ulysses
Titian	Portrait of Charles V at Battle of Mühlberg (showing armor)
Titian	Portrait of Philip II
Turner	Venice
Van Dyck, Sir Anthony	Charles I
Van Dyck, Sir Anthony	William II of Orange
Velasquez	Forge of Vulcan
Velasquez	Portrait of Philip IV
Velasquez	Tapestry-Weaver
Watts, G. F.	Sir Galahad
Zucchero	Sir Walter Raleigh
Zucchero	Queen Elizabeth

Statuary

Title	Artist, etc.
Apollo Belvedere	Vatican
Buddha of Kamakura	See *National Geographic Magazine*, July, 1921
Diana of Versailles	Louvre
David	Michelangelo
Hebe	Thorvaldsen
Joan of Arc	Anna V. Hyatt
King Arthur	Peter Vischer
Lion of Lucerne	Thorvaldsen
Lorenzo de Medici	Michelangelo
Moses	Michelangelo
Nike of Samothrace (Flying Victory)	Louvre
Parthenon Frieze	
Venus of Milo	Louvre

Architecture

England

Westminster Abbey (Great Cathedrals). See *National Geographic Magazine*, July, 1922.

Egypt

Temples of Karnak and Luxor; pyramids and sphinx. See *National Geographic Magazine*, May, 1917; October, 1922.

France

Notre Dame of Paris. See *National Geographic Magazine*, July, 1922.

Rheims and rose window. See *National Geographic Magazine*, July, 1922.

Greece

Parthenon and Greek columns. See *National Geographic Magazine*, October, 1915; December, 1922.

India

Taj Mahal (color). See *National Geographic Magazine*, November, 1921; *Mentor*, March 1, 1915.

Italy

St. Marks and Ducal Palace of Venice. See *National Geographic Magazine*, October, 1916.

Giotto's Campanile of Florence. See *National Geographic Magazine*, July, 1922.

Spain

The Alhambra (color). See *National Geographic Magazine*, August, 1924.

MASTERPIECES TO CORRELATE WITH GEOGRAPHY [1]

Prints of paintings

ARTIST	TITLE
ADAN, LOUIS	The Haymaker (peasant life of France)
BASTIEN-LEPAGE, JULES	The Hay Harvest (peasant life of France)
BRETON, JULES ADOLPHE	Morning (peasant life of France)
BRETON, JULES ADOLPHE	Return of the Gleaners (peasant life of France)

[1] See also "Natural Science," p. 462; "History and Civics," p. 454.

Artist	Title
Breton, Jules Adolphe	Song of the Lark (peasant life of France)
Canaletto	Grand Canal and Rialto in Venice (Italy)
Chao Chang, Mu	Think Thrice, then Act (three egrets, Chinese)
Corot	Dance of the Nymphs
Corot	The Lake (French)
Dupré, Jules	Haying (French)
Dupré, Jules	The Haymakers (French)
Dupré, Jules	On the Prairie (French)
Fang Hsueh-po	Plum Blossoms (Chinese). See *Mentor*, December 2, 1918
Fortuny y Carbó, Mariano	Arab Praying
Geoffroy, Jean	Primary School of Brittany
Gerome	Prayer in a Mosque
Hobbema	Avenue of Trees (Dutch)
Hobbema	The Water Mill (Dutch)
Hoecker, Paul	Dutch Girl with Cat (Holland)
Hokusai, Katsushika	Fujiyama Seen From the Tokaido (Japan)
Hokusai, Katsushika	Lady and Cherry Tree and Landscape (Japan). See *Mentor*, November 1, 1919
Hoffner	In the Highlands
Hsu Ku	The Joy of Life (Chinese)
Jacque, Charles Émile	Feeding the Sheep (French)
Jacque, Charles Émile	Shepherdess
Johnson, Eastman	Old Kentucky Home
Maes, Nicolaas	The Spinner (French)
Mauve, A.	Flock of Sheep (French)
Millet, Jean François	Man with the Hoe (French)
Millet, Jean François	Potato Planting
Millet, Jean François	The Gleaners
Millet, Jean François	Shepherdess Knitting
Millet, Jean François	The Sower
Millet, Jean François	Woman Churning

Artist	Title
Millet, Jean François	Woman Sewing by Lamp Light
Murillo	Melon Eaters and Peasant Boys (Spanish)
Ruysdael, Jacob	The Mill (Dutch)
Troyon, Constant	Oxen Plowing (French)
Troyon, Constant	Return to the Farm (French)
Vagroz, Jacques Clément	Corner in Venice
Van Ostade	Canal in Holland (Dutch)
Vernet, Émile Jean Horace	Prayer in the Desert
Veyrassat	In Normandy

For statuary and architecture see "History and Civics," p. 465.

Illustrated books

Artist	Title
Guérin, Jules	Egypt and its Monuments (Robert Hichens)
Parrish, Maxfield	Golden Treasury of Songs and Lyrics (edited by F. T. Palgrave)
Rackham, Arthur	The Romance of King Arthur (abridged by Pollard)

Magazines

Chinese Paintings. *Mentor*, December 2, 1918.
Chinese Paintings. *Asia* (examples in nearly all copies).
Chinese Rugs. *Mentor*, March 1, 1916 (six colored plates).
Japanese Paintings. *Mentor*, November 1, 1919 (six plates).
Japanese Paintings. *Asia*, November, 1919.
Lace and Lace Making. *Mentor*, May, 1917.

MASTERPIECES TO CORRELATE WITH MUSIC

Prints of painting

Artist	Title
Breton, Jules Adolphe	Song of the Lark
Dicksee, Margaret I.	Child Handel
Dicksee, Margaret I.	Young Handel
Duveneck	The Whistling Boy

Artist	Title
Eickemeyer, Rudolph	The Whistling Boy
Gow, A. C.	A Musical Story by Chapin
Leighton	The Music Lesson
Naujok	St. Cecilia
Potter, Frank H.	The Music Lesson
Raphael	St. Cecilia
Rembrandt	Singing Boy
Terburg	The Concert
Watteau, Jean Antoine	The Minuet
Wunch	The Music Lesson

Statuary

Artist	Title
Donatello	The Singing Boys
Robbia, Luca della	Singing Boys with Scroll
Robbia, Luca della	Singing Gallery

V. HEALTH EDUCATION

Flat pictures and charts

Colgate Co., Department 30, 199 Fulton Street, New York.
Dental charts. These make mouth hygiene interesting.

Children's Bureau, United States Public Health Service, Washington, D.C.
Sets of health and welfare posters (sold at cost).

Metropolitan Life Insurance Company, New York City.
Child Health Alphabet (booklet; no charge).
Mother Goose Rhymes (booklet; no charge).
Clean Up (poster, 8″ × 11″).

National Child Welfare Association, Educational Building, 70 Fifth Avenue, New York City.
Panels (17″ × 28″, 85 cents).
Lantern slides (85 cents).
Foods and health (10-panel set, $8.00).
The A-1 American Girl Plays Hard.
The A-1 American Girl Works Hard.
Modern Health Crusaders (10-panel set, $8.00).
Mother Goose Health Rhymes (8-panel set, $5.00).

Rice and Hutchins, Inc., 10 High Street, Boston, Massachusetts.
Shoe chart (no charge). Effect of shoe on shape of foot.

Spalding Athletic Library (any athletic-goods store).
Cut out and mount the pictures.
Official Baseball Guide (25 cents).
Official Basketball Guide (boys) (25 cents).
Official Basketball Guide (girls) (25 cents).
How to play baseball (10 cents).
How to pitch (10 cents).
How to catch (10 cents).
Volley ball rule book (10 cents).
Pyramid Building (25 cents).

Stereopticon slides

American Red Cross, Washington, D.C.
Jonathan Rawson, Jr., Publishers, 18 East Thirty-seventh Street, New York City.
National Child Welfare Association.

Film slides

See full list in Spencer Lens Company's catalogue.

Motion pictures

Several excellent films may be rented from various distributing bureaus, such as "Mouth Hygiene," "Good Teeth," "Saving the Eyes," "How to Revive the Drowning," "Swat that Fly," "Mosquito and Fly Control," "Heart and Circulation of the Blood," "The Story of Digestion," "Waste Disposal of Cities," "First Aid in Your Home," "The Knowing Gnome," and others.

Teachers will also find valuable films produced specifically for teaching healthful sports and exercises. The following have been used to good advantage in junior-high and high schools:

Athletics, Track and Field (correct form in field events). 2 reels.
Group Games (twenty-five most popular group games). 1 reel.
Swimming (a teaching film, sections in slow motion). 1 reel.
Tumbling, Elementary and Advanced (including slow motion). 3 reels.

These four sets of physical education films are distributed by educational institutions in the various states.

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